PAPER TRADE JOURNAL

THE INTERNATIONAL WEEKLY OF THE PAPER AND PULP INDUSTRY AND THE PIONEER PUBLICATION IN ITS FIELD

SEPT. 9 1937

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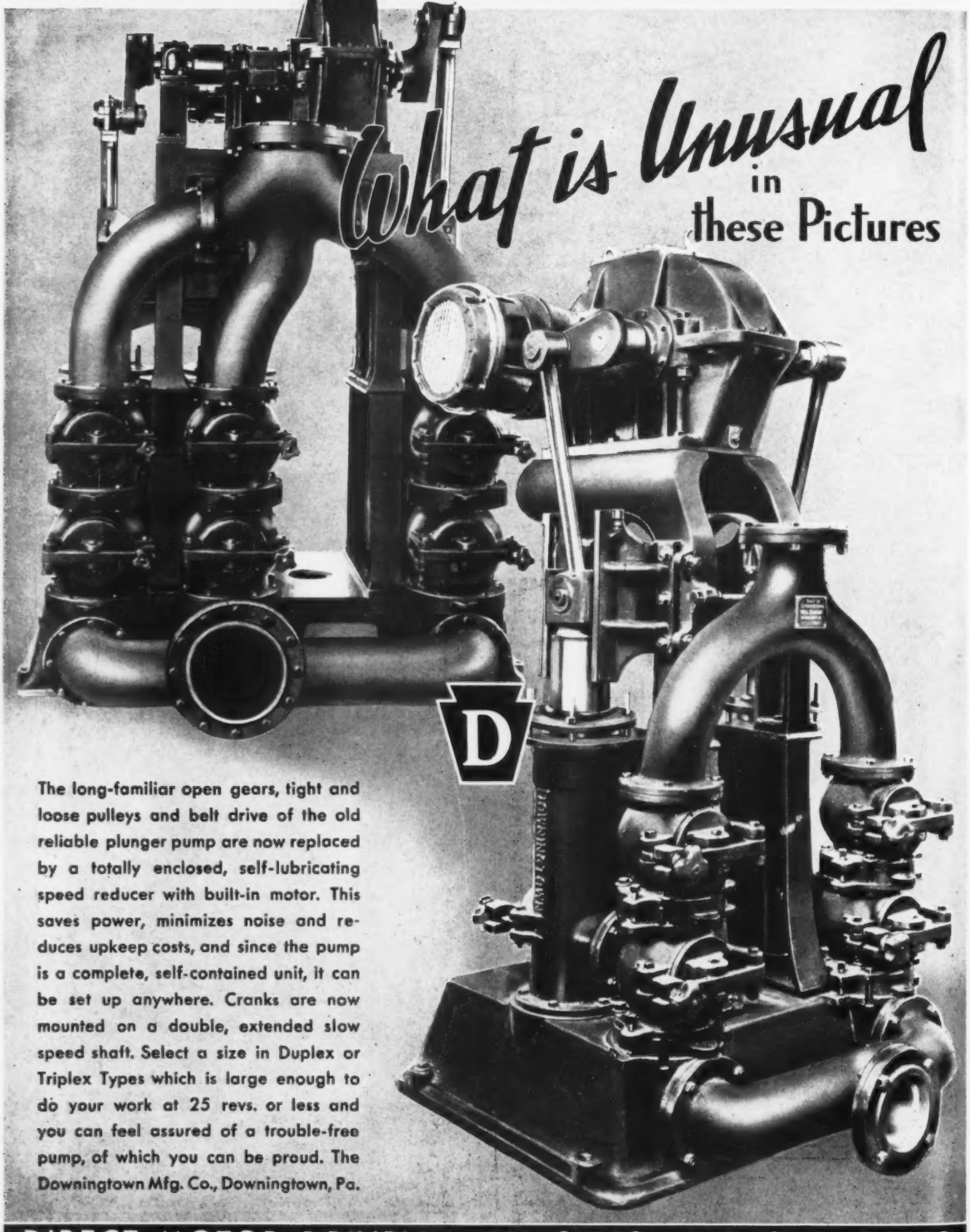
No. 11

66th Year

DOWNINGTOWN



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PAPER TRADE JOURNAL

THE INTERNATIONAL WEEKLY OF THE PAPER AND PULP INDUSTRY AND THE PIONEER PUBLICATION IN ITS FIELD

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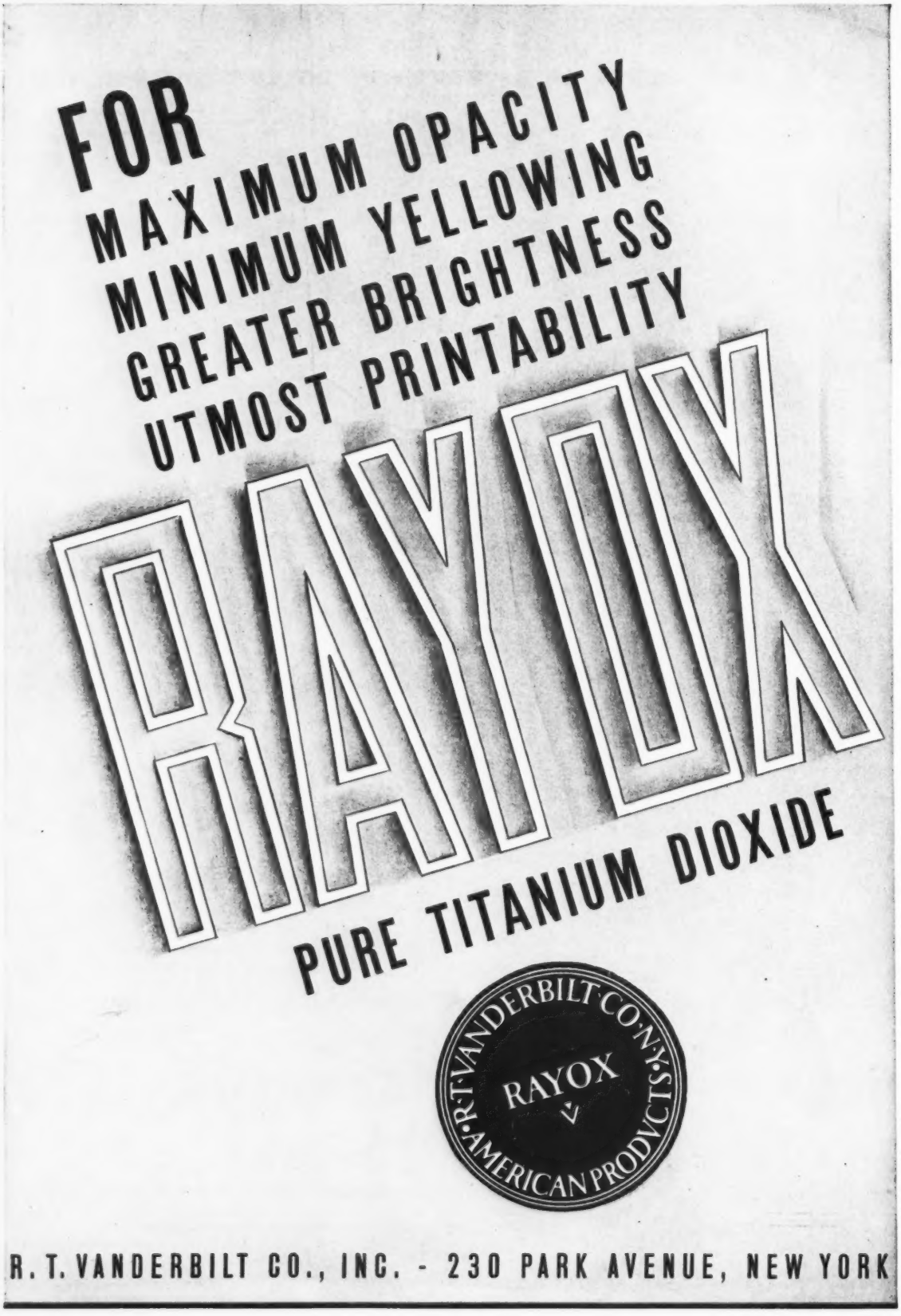
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PAPER TRADE JOURNAL

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PAPER — SIXTY-SIXTH YEAR — PAPER

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Vol. CV, No. 11 Thursday, September 9, 1937

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Paper Production Shows 14 Per Cent Increase

According To Preliminary Census Figures Just Received Production of All Varieties of Paper and Paper Board Amounted To 11,975,552 Tons In 1936 Compared With 10,479,095 Tons In 1935—Production By States.

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., September 7, 1937—The tonnage of paper and paper board produced in the United States in 1936 showed a substantial increase as compared with 1935, according to a preliminary report just released by Director William L. Austin, Bureau of the Census, Department of Commerce.

Figures for 1936 and 1935

The figures for two years are: 1936, 11,975,552 tons; 1935, 10,479,095 tons; per cent of increase, 14.3.

Figures Subject to Revision

All figures for 1936, as given in this report, are preliminary and subject to revision.

TABLE I.—PAPER AND PAPERBOARD—PRODUCTION, BY KIND AND QUANTITY, FOR THE UNITED STATES: 1936 AND 1935

[The schedules used in making the canvasses for the even-numbered years are less detailed than those for the odd-numbered years, and consequently some of the items in this table may not be strictly comparable as between the two years]

Kind	Tons (2,000 pounds) 1936	1935
Aggregate	11,975,552	10,479,095
Newsprint, standard	938,287	947,717
Hanging paper	116,215	105,177
Catalog paper	82,576	79,979
Book paper, uncoated	1,420,150	1,281,870
Cover paper	43,420	20,806
Writing paper, total	602,329	507,325
Rag content	84,945	75,702
Sulphite bond	355,258	283,411
Other chemical wood-pulp	162,126	148,212
Wrapping paper, total	1,879,323	1,632,054
Sulphite	334,382	332,336
Kraft	1,212,347	984,784
Other	332,594	314,934
Tissue paper, total	494,721	473,214
Toilet	220,920	223,721
Towel	93,056	65,462
Other	180,745	184,031
Absorbent paper	105,997	95,179
Building paper	549,701	440,704
Other paper	288,196	199,180
Paperboard, total	5,454,637	4,695,890
Container board	2,756,286	2,358,093
Folding boxboard (bending)	1,272,147	1,120,546
Set-up boxboard (nonbending)	700,769	623,890
Binders' board	58,004	61,603
Cardboard	108,499	103,053
Leatherboard	23,375	26,759
Pressboard	11,229	7,216
Building board	98,389	394,730
Other boards	425,939	

TABLE II.—PAPER AND PAPERBOARD—PRODUCTION, BY QUANTITY, BY STATES: 1936 AND 1935

[Statistics are presented for all States for which separate figures can be published without disclosing the exact or approximate production reported by individual establishments. Larger quantities of paper and paperboard were reported, however, from some of the "Other States" than from some of the States for which separate figures are given].

State	Tons (2,000 pounds) 1936	1935
United States	11,975,552	10,479,095
California	265,662	221,763
Connecticut	212,754	180,768
Delaware	25,521	9,432
Illinois	551,414	488,202
Indiana	280,569	246,726
Louisiana	513,304	449,214
Maine	981,810	907,531
Maryland	157,423	131,076
Massachusetts	494,058	427,708
Michigan	1,217,796	1,044,778
Minnesota	265,014	236,887
New Hampshire	152,547	149,664
New Jersey	637,398	579,177
New York	1,326,891	1,129,201
North Carolina (see below)		
Ohio	947,222	837,105
Oregon	262,478	242,085
Pennsylvania	795,247	694,690
Tennessee	101,003	90,175
Vermont	76,858	66,059
Virginia	406,970	355,525
Washington	506,579	465,708
West Virginia	53,526	46,991
Wisconsin	892,681	792,117
North Carolina	104,938	
Other States [1]	745,889	686,513

[1] Alabama, Arkansas, District of Columbia, Florida, George, Iowa, Kansas, Mississippi, Missouri, Rhode Island, South Carolina, and Texas, for both years, and in addition, North Carolina for 1935.

Port Mellon Mill Resumes

VANCOUVER, B. C., September 4, 1937—Following a temporary shut-down since mid-July the plant of the Vancouver Kraft Company Ltd. at Port Mellon, Howe Sound, B. C., has resumed production. This shut-down was deemed advisable owing to impossibility of securing cargo space for its products as a result of the famine in tonnage on the Pacific and the abnormal high freight rates. A ship has been secured and will load in mid-September and the plant is turning out 60 tons of kraft per day. The major output will be sold in Japan and in the United States. The company was only operating a few months when it was compelled to close down, but officials believe they will be able to arrange for regular space for plant products in future.

Wisconsin Mills Lead in Crepes and Tissues

Capacity of State Now Over Million and Quarter Pounds Daily — Production About 28 Per Cent of Domestic Total — Paper Board Output Rises — Over 75 Million Trees in State's Nurseries—School for Workers.

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., September 7, 1937—Wisconsin's constantly growing demand for tissues and crepes has given it the lead for the country as a whole, according to the study of the pulp and paper industry completed recently by the bureau of foreign and domestic commerce at Washington, D. C.

The state's capacity of 1,290,000 pounds every 24 hours accounts for 28 per cent of the total productive capacity of the country. From Brown county comes the largest production of any county in the United States. The combined production of the Northern Paper Mills, the Hoberg Paper Mills, Inc., and the Fort Howard Paper Company, located at Green Bay, is 530,000 pounds every 24 hours. Tissue and crepe capacity listed for other counties is as follows: Outagamie, 220,000; Winnebago, 138,000; Marinette, 190,000; Oneida, 100,000; Ashland, 40,000; Portage, 72,000.

In the 57 Wisconsin paper mills, the 24-hour capacity is listed at 6,692,000 pounds, with Outagamie county's 11 mills leading with 1,215,000 pounds. The production other than tissue is: Book and writings, 1,325,000 pounds; newsprint, 465,000 pounds; paperboard, 750,000; wrapping and bag, 250,000; specialty and miscellaneous, 2,612,000. Capacity of the 23 pulp mills is 3,994,000 pounds every 24 hours. Wood county leads with a 920,000-pound capacity of pulp. Marathon county is second with 800,000 pounds, and Outagamie county is third with 740,000 pounds.

Wisconsin as a whole was fifth in production of paper and paperboard last year, in the country as a whole, with 892,000 tons. This is an increase of 100,564 tons over 1935.

Increases Wire Production

Production at the Wisconsin Wire Works, Appleton, Wis., has shown an increase over last year, according to company officials. A slight slump was noticeable in July, but demand has picked up. Business as a whole is better than last year. The company is producing 90 per cent of its wires in bronze in response to customer demand. This is a reversal from two years ago, when 90 per cent of the output was brass.

More Trees in State Nurseries

More than 75,000,000 trees, a year or older, are growing in the four state nurseries at Wisconsin Rapids, Trout Lake, Gordon and Athelstane, Wisconsin, according to C. L. Harrington, state superintendent of forests. Wisconsin Rapids, where the Consolidated Water Power and Paper Company is located, has the largest number 59,000,000 trees. The present plantings are sufficient to plant 100,000 acres of land, and are gradually being transferred to state and county-owned forests. The principal varieties are white, Norway, jack and Scotch pines, and white and Norway spruce. About 9,000 acres were planted this year. The program is aimed principally to perpetuating the pulpwood supply and the woodworking industry of the State. Cutover lands are no longer left to grow wild with a miscellaneous variety of trees, but are planted with varieties that will be needed for commercial use under selective cutting.

School for Paper Mill Workers

Paper mill workers will provide the principal source of enrollment for an extension school for industrial workers in the Fox and Wisconsin River Valleys, to be conducted this season by the University of Wisconsin.

After twelve years of experimentation with a summer school for industrial workers on the university campus, the finishing touches are being put on a plan for a system of classes in labor problems, economics, labor history, parliamentary law, social psychology, labor law, and specialized work in the economics of particular industries such as the paper and pulp mills. Travelling teachers will make a circuit of the industrial sections of the state. "The purpose of the school," says Prof Selig Perlman, university professor of economics and a labor expert, "is to assist the labor movement by training people to carry on collective bargaining." The growing need for working out labor relations matters in the light of labor and social legislation has caused the launching of the school, which will be open to all workers, no matter what their union affiliations. The aim is to enroll 1,000 throughout the state.

Hearings on Water Supply

Hearings which were to have been held this month on the demand for a series of storage reservoirs for the Fox and Wolf Rivers have been extended by the War Department to Nov. 1. The extension was granted on request of the Fox-Wolf Improvement and Conservation Association, which is preparing a brief of its reasons why the project should be carried on. The need of an adequate water power supply by the paper mills during low stages in the summertime, and for flood control during spring thaws, is to be argued in order to change the decision of the engineers opposing the expenditure.

Visitors at Institute of Paper

Visitors from every state in the union and from foreign countries all over the world have visited the Institute of Paper Chemistry, Appleton, Wis., during the last six years, the records show. Since the main building was completed and opened in October, 1931, a total of 8,000 have been registered as visitors, the majority connected with or definitely interested in the paper industry. In addition to all the principal countries of Europe, residence data reveal Canada, China, Australia, New Zealand, and Central and South America.

Paper Mills Close for Holiday

Practically all of the paper mills in Wisconsin

were closed down for the Labor Day week-end, and picnics or programs were arranged by the labor unions. One of the principal gatherings for paper mill workers was held at Menasha, Wis., where John P. Burke of Fort Edward, N. Y., president of the International Brotherhood of Pulp, Sulphite and Paper Mill Workers of America was the main speaker. Raymond Richards of Wisconsin Rapids, Wis., vice-president of the International Brotherhood of Pulp, Sulphite and Paper Mills Workers, also spoke.

Employees of the Badger Paper Mills, Inc., Peshtigo, Wis., held their annual picnic Sunday, September 5, at the city park. An all-day program was conducted with band concerts, athletic events and various contests.

State Water Board Elects

A new state water regulatory board established by the 1937 Wisconsin Legislature will have as its chairman Adolph Kannenberg, who formerly was water power counsel for the Wisconsin Public Service Commission. Other members will be Prof. E. R. Jones of the University of Wisconsin, and Walter Choinski, of the Wisconsin Conservation Commission. The board will supervise operation and maintenance of dams and streams. H. V. Tennant is engineer for the board.

Program for Paper Trade Meeting

The following is the preliminary program for the semi-annual convention of the National Paper Trade Association to be held at the Stevens Hotel, Chicago, September 20-23 inclusive:

MONDAY, SEPTEMBER 20

9:30 A. M. Book and Offset Committee. Private dining room 4.
9:30 A.M. Gummed Tape Committee. Private dining room 1.
11:00 A.M. Groundwood and Newsprint Committee. Private dining room 4.
11:00 A.M. Wrapping Paper Merchandising. Private dining room 5.
2:00 P.M. Opening Session. North ball room. President F. B. Tracy presiding.
Address: John Cameron Aspley, president, Dartnell Publications, Inc., publishers of "American Business."
Report on National Council of Wholesalers Association, C. D. McKim, Motor and Equipment Wholesalers Association.
Executive Session: Reports on recent developments in Paper house management.
4:30 P.M. Survey Committee. Private dining room 5.
4:30 P.M. Traffic Committee. Private dining room 6.
8:00 P.M. Fine Paper Merchandising Committee. Private dining room 5.

TUESDAY, SEPTEMBER 21

9:30 A.M. Writing Paper Committee. Private dining room 4.
9:30 A.M. Wrapping Paper Committee. Private dining room 2.
11:00 A.M. Wrapping Specialties Committee. Private dining room 5.
11:00 A.M. Envelope Committee. Private dining room 6.
2:00 P.M. Bag Committee. Private Dining room 2.
2:00 P.M. Bristol Blank Board and Tag Committee. Private dining room 5.
4:30 P.M. Governing Committee, Fine Paper Division. Private dining room 4.
4:30 P.M. Governing Committee, Wrapping Paper Division. Private dining room 1.
8:00 P.M. Board of Directors. Private dining room 4.

WEDNESDAY, SEPTEMBER 22

9:30 A.M. Tissue Committee. Private dining room 4.
10:00 A.M. Fine Paper Division meeting. North ball room. Vice-President G. G. Cobean presiding.
11:00 A.M. Wrapping Merchandising Forum. Private dining room 1.
2:00 P.M. Wrapping Paper Division Meeting. North ball room. Vice-President F. T. Jamison presiding.

THURSDAY, SEPTEMBER 23

10:00 A.M. Semi-Annual Meeting—N.P.T.A. North ball room. President F. B. Tracy presiding.
Address of the President.
Address: Westbrook Steele, Director, Institute of Paper Chemistry, Appleton, Wis.
Report of Board of Directors.
Report of Treasurer.
Report of Executive Secretary.
Address of Counsel, J. K. Javits.

Government Paper Bids

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., September 8, 1937—The Government Printing Office has received the following bids for 27,260 pounds (80,000 sheets) of 50 per cent rag, white ledger paper: Stanford Paper Company, 17 cents per pound; Old Dominion Paper Company, 14.24 cents (all or none); Mount Holly Paper Company, 13.47 cents (all or none); R. P. Andrews Paper Company, 11.25 cents (all or none) and 12.25 cents; Reese & Reese, Inc., 11.33 cents; Walker, Goulard, Plehn Company, 15.6 cents; Dobler & Mudge, 16.5 cents; L. Hyman & Sons, 11.25 cents (all or none); and Charles E. Beers & Company, 16.25 cents.

For 10,000 pounds (93,000 sheets) of 50 per cent rag, white ledger paper: Stanford Paper Company, at 15.5 cents; Old Dominion Paper Company, 14.23 cents (all or none); Mount Holly Paper Company, 13.47 cents (all or none); R. P. Andrews Paper Company, 11.25 cents (all or none) and 12.25 cents; Whitaker Paper Company, 15.5 cents; Reese & Reese, Inc., 11.33 cents; Walker, Goulard, Plehn Company, 15.6 cents; Dobler & Mudge, 16.5 cents; Mathers-Lamm Paper Company, 15.5 cents; L. Hyman & Sons, 11.25 cents (all or none); and Charles W. Beers & Co., 15.5 cents.

Ontario Paper Co. Acquires Timber Limits

Gets 600 Square Miles On the Black River At Heron Bay — Newly Formed English River Pulp and Paper Co. To Build Railway From Kenora Into English River Timber Limits — Paper Demand Is Quiet.

[FROM OUR REGULAR CORRESPONDENT]

TORONTO, Ont., September 7, 1937—Hon. Peter Heenan, Ontario Minister of Lands and Forests, announced at Port Arthur last week, that the Ontario Paper Co., operating newsprint mills at Thorold, had obtained 600 square miles of timber limits on Black River at Heron Bay, 180 miles east of Port Arthur. He said expenditure on a drum barking mill and other facilities would be $500,000 to $750,000, and that power will be developed on Black River. More than 400 men will be employed, company officials said, and about 50,000 cords of wood would be taken out each year.

Pulp Company To Build Railway

Through an agreement with the Ontario Government the newly formed English River Pulp and Paper Co. will build a standard gauge logging railway from Kenora into the English River timber limits. Construction of the railway will begin before the New Year. No estimate has been announced as to the track mileage. Before Sept. 1, 1938, the company is to begin construction of a pulp mill or a newsprint mill with a minimum capacity of 200 tons a day, the mill to be completed before May, 1940, it was officially stated by the Minister of Lands and Forests.

Wholesale Paper Demand Quiet

The wholesale paper trade in Ontario is still in the doldrums and the volume of trade continues small, due to the protracted heat wave and the absence from their desks of sales managers and paper buyers. While there is quiet confidence in the future, at this period last year more business was being done in the wholesale paper line than is being transacted now. Paper merchants are not getting the volume now although demand has kept up well until the summer slump set in. That there is very good business in the immediate future, is the general belief in the paper trade.

The mill trade continues active with a satisfactory volume of business on current account as well as for future delivery. Mills manufacturing fine papers are just beginning to get caught up on their orders and there is quite a volume of trade in sight for the fall months. The demand continues good for nearly all lines of fine papers, especially book and litho lines and mills making bonds, ledgers and writings are quite busy. Converting papers are a little slow and envelope paper manufacturers report less activity than expected. The coarse paper market is somewhat dull, with the volume of sales down.

The First Wall Paper Plant in Canada

What is claimed by the Company to be the most modern and scientifically equipped wallpaper plant in the world has recently been completed at Leaside, adjacent to Toronto, by Stauntons Limited and the event has been marked by the issuance of a very neat booklet dealing with the history of the firm. About the year 1852 the late M. Staunton, Sr., who for many years had conducted a wallpaper business in Belfast, sailed for the United States with Philadelphia as his destination.

The ship was wrecked and the passengers were landed at Halifax. The accident changed Mr. Staunton's plans and he went to New York instead of Philadelphia. He entered business in New York but during a holiday visit to Niagara Falls, saw a Union Jack floating from a building across the gorge and this led him to come to Canada. He settled in Toronto and opened a large wallpaper warehouse at the northwest corner of King and Yonge streets. A little later Mr. Staunton bought a site on Queen street and there built the first wallpaper plant in Canada.

The rapidly growing business soon made the first factory inadequate and a new one was built on Front street. This continued in operation until 1871 when it was destroyed by fire. M. Staunton, Jr. who had become associated with his father in the concern, was on his way to England at the time of the fire. His father immediately cabled him to order machinery and equipment for a new factory. A site was chosen on Yonge street in the then village of Yorkville, where the nucleus of the factory just vacated by the company was established. Mr. Staunton, Sr., died in 1877 and the business was continued by his sons, M. Staunton, Jr. and Albert A. Staunton, the latter of whom retired in 1885. From time to time the factory was enlarged while new machinery was installed as it was invented. Some important new inventions in the wallpaper industry have been developed at the Staunton plant. In 1900 the business was incorporated as a limited liability company under the present name. M. Staunton, Jr., was president until his death in 1902. Thomas Arthur Staunton, his eldest son, then became president, holding the office until his death in 1915. Edmund G. Staunton succeeded him in the presidency. The vice-president is Gerald Staunton, who was last year chairman of the Toronto Branch of the Canadian Manufacturers Association and is now chairman of the Ontario Division.

Labor Content in Miami Valley

DAYTON, Ohio, September 7, 1937—Labor Day was more generally observed by Miami Valley paper mills and business concerns in general, than for several years. Several reasons for this condition have been advanced but probably the most significant is the fact that business in nearly every manufacturing line is at top notch. Some of the valley paper mills have signed satisfactory labor agreements with their working forces and have adjusted working conditions and increased wages.

Most of the Miami Valley paper mills have had about as much business as they could conveniently handle, and it develops that with the mill workers laboring under improved conditions, they produce a greater volume of output and are entitled to the "time off" during the holiday period.

Production Costs May Force Prices Up

Retail Volume Insufficient Now to Increase Prices — Improved Demand By Middle of Month Expected to Result in Higher Levels — Exhibitors At N. P. T. A. Meeting — Colored Return Envelopes Recommended.

[FROM OUR REGULAR CORRESPONDENT]

CHICAGO, Ill., September 7, 1937—Summer heat put a partial brake on the early September paper market in the Chicago area. Unseasonable weather slowed up retail trade while market observers still felt that there was not sufficient volume in prospect to initiate the long expected higher prices. However, there are those who feel that about September 15 will see the necessary reaction to tremendously increased costs of production and improved demand will force prices to higher levels.

Meanwhile, others feel that the Fall meetings of the National Paper Trade Association will mark the turning point and will watch the proceedings of the big convention with a great deal of interest. The waste paper market seems to be receiving more stimulus than any other grades. Foreign demand has picked up materially, mills are showing more interest and activity is developing in virtually all grades of waste, according to local reports. The fine paper market is little changed, with all grades reporting a slackened demand but a firm undertone. Groundwoods and newsprints are little changed although the outlook is certainly improved over the corresponding period of last year. Books and covers made no change during the week. Specialty papers remained about the same. The board market also made little headway during the week.

Exhibits at N.P.T.A. Sessions

With but three weeks intervening before the fall meeting of the National Paper Trade Association, the local paper industry is estimating just how popular the three day session will be. A record attendance is expected and a number of reasons are given for this expectation. First of all, improved business and the increasingly apparent need for cooperative effort is expected to help attendance. However, a great deal of credit is being given the exhibits which are for the first time to be controlled by the Association and scientifically arranged in the Hotel Stevens. Manufacturers' lines and new products are certain to prove a magnet for many newcomers and September 23, set aside as Salesmen's Day, is also expected to help swell the attendance. To date, about forty well known companies have made arrangements to exhibit their wares. These include the Orchard Paper Company; Crystal Tissue Company; Central Paper Company of Menasha; Detroit Sulphite Pulp and Paper Company; Central Paper Company, Muskegon; APW Paper Company; Lily-Tulip Cup Company; Kalamazoo Vegetable Parchment Paper Company; Hobert Paper Mills, Hooven and Allison; Wolf Brothers and the Bay West Paper Company.

Others are the Nekoosa-Edwards Paper Company; White Washburne Company; Diana Manufacturing Company; Sealright Company, Inc., January & Wood; Brown Company; Sherman Paper Products Company; Racquette River Paper Company, Brower Paper Company; Midland Products, Inc., A. C. Hummel Company; Minerva Waxed Paper Company; Brown-Bridge Mills; Dixie-Vortex Company; A. W. Mendenhall Company; Jay Dee Products Company; Kleem Products Company; Penley Brothers Company and Paper Plates & Tray, Incorporated.

Filter Paper Leases New Building

The Filter Paper Company has leased for immediate occupancy for a term of years a modern three story brick building at 57-61 East 34th street on Chicago's South Side.

Postoffice Prefers Longer Enclosures

The Midland Paper Company, division of the Zellerbach Paper Company, has issued the latest "Informant," house organ of the national known paper house. The September issue is filled with interesting information covering "Printing Trends in Europe" and "The Story of News Print Paper" together with some outstanding examples of possibilities for business development by printers. Perhaps one of the most interesting items is that coming from the DMAA which states that long envelopes are much preferred by the Postoffice Department than the short variety. It seems as though long envelopes must be culled out and put into different cancelling machines, thereby giving them some advance handling. Postal authorities suggest that long envelopes are thus likely to get preferred treatment during the holiday rush in particular.

Color in Return Envelopes

The Heco Envelope Company, Chicago, advises customers that gaily tinted return envelopes invite their use and stimulate action. The company adds that if laid aside for future consideration, the colorful return envelope stands out in a pile of papers as a constant reminder. Actual tests have proven tinted return envelopes better result-getters, according to the envelope manufacturers, adding that "the increase in cost over manila or kraft return envelopes is infinitesimal when compared with the total cost of a mailing and with the results attained."

Menasha To Install Steam Plant

Appleton, Wis., September 7, 1937—Permission has been granted by the Wisconsin Public Service Commission to the City of Menasha, Wis., to install a steam generating plant at its municipal utility, which supplies power to a number of paper mills. The plant will cost about $260,000, and will have a generating capacity of 2,000 kilowatts. An alternative proposal was included for a 2,000-kilowatt plant plus equipment for servicing the excess steam, costing $346,500. The permit hinges on the ability of the city to secure additional demand for electricity and for the by-product steam. Should the city obtain a load demand for its utility of $9,000,000 kilowatt hours of electricity in addition to its present load, a 3,000-kilowatt plant can be installed, with equipment for furnishing by-product steam, at a cost of $383,000

Demand for Canadian Pulp and Paper Rising

Government Reports Exports of Paper Up Over Three Million Dollars—Pulp Rise Over Half a Million In Like Period — Ste. Anne Company To Reopen Mill Closed Six Years — Donnacona Will Increase Its Output.

[FROM OUR REGULAR CORRESPONDENT]

MONTREAL, Que., September 7, 1937—A remarkable picture of the rapidly increasing demand for Canada pulp and paper is provided by the detailed returns of exports for July just released by the Dominion Bureau of Statistics. The total wood pulp exported in July was valued at $3,630,824, an increase of $754,210 as compared with July, 1936; and of paper and manufactures of paper the value was $11,965,649, an increase of $3,315,064; a total increase of $4,069,274. For the four months of the fiscal year the total exports of wood pulp were $13,941,403, an increase of $3,981,928; and of paper $45,630,678, an increase of $9,903,479; total increase for the four months, $13,885,407.

In respect to paper, most of the increase was, of course, in newsprint, of which the export for July amounted to 6,103,263 cwt., valued at $11,234,434, as compared with 4,680,980 cwt., valued at $8,046,237, in July, 1936; while for the four months ending July the exports were 23,186,502 cwt., valued at $42,586,657, as compared with 19,376,398 cwt., valued at $33,423,472.

More Mills Reopening

Premier Duplessis states that he has received official notice from the Consolidated Paper Corporation that its mill at Cap de la Madelaine, Que., will probably be re-opening next spring, after being closed for five years. The company is now carrying out work at the mill to this end. The mill has a capacity of 520,000 lbs. of newsprint daily and 50,000 lbs. of wrapping. The groundwood plant has a capacity of 400,000 lbs. of pulp, and there is capacity also for the production of 180,000 lbs. of sulphite fiber and 130,000 lbs. of sulphate fiber.

Mr. Duplessis has further announced that the government is now studying five propositions relative to the proposed re-opening of the groundwood pulp mill at Chicontimi, which has a capacity of 600,000 lbs. of dry groundwood per day, and which is owned by the Quebec Pulp and Paper Corporation. One of the five propositions, he states, comes from a foreign company.

Ste. Anne Opens Next Month

It is expected that the mill at Beaupre, owned by the Ste. Anne Paper Company, a subsidiary of the Abitibi Power and Paper Company, which has been closed for six years, will be reopened next month. An 8-mile flume, running from Seven Falls to the mill, has been completed, making possible the conveyance of 50,000 cords of wood cut last winter. The mill has two 234-inch Fourdriniers for the manufacture of newsprint, and there are groundwood and sulphite plants.

Donnacona's Capacity Enlarged

The Donnacona Paper Company has practically completed the program of alterations and improvements at its mill at Donnacona, Que. The improvements, it is stated, will reduce the cost of operations throughout the newsprint mill as well as add an estimated 15,000 tons per annum to newsprint capacity plus an additional 30,000 tons per annum of groundwood pulp. The power plant is nearly finished and it is expected that some time next month 2,500 h.p. will be added to Donnacona's power capacity.

Lumber Cutting Contract

The Consolidated Paper Corporation has awarded a contract for cutting 45,000 feet of lumber at Escoumains on the north shore of the St. Lawrence to the firm of Villeneuve and Tremblay of Chicoutimi. The lumber will be used in the company's Port Alfred mills. The cut, starting next week, will provide work for nearly 600 men.

To Sell Sulphate Mill at Karlsborg

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., September 8, 1937—The liquidators of Kalix Traindustri Aktiebolag are inviting tenders for the sawmill and sulphate mill of the company at Karlsborg, Sweden, according to a report from Commercial Attache Charles E. Dickerson, Jr., at Stockholm. The company went into liquidation last year following the decision of the Riksdag that the Government Forestry Department should take over the working of the plant. As a matter of procedure, however, all the assets will be offered for sale to the highest bidder, even though there is a fair certainty that they will be purchased by the State and handed over to a new company to be run by the Forestry Department. The situation has changed to some extent, however, as the better outlook in the wood and pulp trades has enabled the liquidators to carry on work at the mills with better financial results. The works at Karlsborg has relied entirely on the Government forests in Norrbotten for the supply of wood, and any private buyer would therefore to some extent be dependent on the local public and private forest-owners.

The capacity of the sulphate mill is about 23,000 tons of kraft pulp. The sales announcement states that raw materials for the working year 1937-38 are available, and will be included in the sale.

Pipe Repair Handbook

Engineers, superintendents and maintenance men responsible for pipe line maintenance will be interested in the new "Pipe Repair Handbook," published by M. B. Skinner Company, South Bend, Ind. It discusses all the various kinds of leaks in pipe lines—holes, splits, pitted or corroded sections; and joints of various kinds, such as threaded joints, bell and spigot joints, welded joints, collars, etc.; and discloses how repairs may be made without service interruption. The Handbook is furnished without cost to men responsible for pipe maintenance.

Financial News of Pulp and Paper Industry

Sentiment For Brown Reorganization Grows Throughout New England — Preferred Stockholders of Abitibi Favor Bondholders' Reorganization Plan — Puget Sound Offers 6 Per Cent Cumulative Preferred Stock.

New York Stock Exchange

High, Low and Last for the Week Ending September 8, 1937

	High	Low	Last
A. P. W.	6¾	5⅞	5⅞
Armstrong Cork Co.	60	53¼	54⅞
Celotex Corp.	40	34	34
Celotex Corp., pf.	76	70	70½
Certain-Teed Products Corp.	12¾	9⅛	9⅛
Certain-Teed Products Corp., pf.	50	48¼	48¼
Champion Paper & Fibre Co.	52¾	46	47
Champion Paper & Fibre Co., pf.	110	109	109
Congoleum-Nairn Co.	37½	32	32
Container Corp. of Amer.	28⅜	22½	23
Continental-Diamond Fibre Co.	15	13¾	13¾
Crown Zellerbach Co.	22	18⅜	18⅞
Crown Zellerbach Co., cum. pf.	99	93	....
Flintkote Co.	26⅛	22½	22⅝
Robert Gair	13	9½	10¼
Robert Gair, pf.	33	32	....
International Paper & Power (a)	19⅜	15	15¼
International Paper & Power (b)	13¾	10⅜	10⅜
International Paper & Power (c)	7	5¼	5⅜
International Paper & Power, pf.	104	88	89
Johns-Manville Corp.	129	110	113
Kimberly-Clark Corp.	38¾	35½	....
MacAndrews & Forbes	32	32	32
Masonite Corp.	51¼	44	44
Mead Corp.	26½	21¾	21⅞
Mead Corp., pf.	89	89	89
Paraffine Companies, Inc.	69⅛	64	64
Paraffine Companies, Inc, pf.	108	90	....
Ruberoid Co.	32	28	28
Scott Paper Co.	42	40½	40½
Sutherland Paper Co.	30¼	28⅜	....
Union Bag & Paper Corp.	76⅛	66	68
United Paperboard Co.	9⅜	7	7⅜
U. S. Gypsum Co.	101¼	89½	90
U. S. Gypsum Co., pf.	161	160	160

New York Curb Exchange

High, Low and Last for the Week Ending September 8, 1937

	High	Low	Last
American Box Board Co.	18	17¾	17¾
Brown Co., pf.	75	65	65
Great Northern Paper Co.	37½	36	36
St. Lawrence, pf.	28	28	28
St. Regis Paper Co.	7¾	6	6
St. Regis Paper Co., pf.	106	105	105
Taggart Corp.	9¼	9	9

Sentiment for Brown Plan Grows

Sentiment for immediate approval of a plan on file in the U. S. District Court at Portland, Me., for reorganization of the 85-year old Brown Company, is growing by leaps and bounds throughout New England. More than a score of town councils already have passed resolutions urging bond and shareholders to give immediate consent to the plan so that "the company can go forward with its plans for expansion."

The latest resolution pledging support to the present management of the $75,000,000 company was passed by the Selectmen of Coos County, representing 18 New Hampshire towns. In a militant mood, they accused the Boston Bondholders' Committee, which has sent out notices asking bondholders to withold assent to the plan, of "acting like buzzards after a corpse."

"The Brown Company is the livest industry in the state," the resolution declared, "and the citizens of New Hampshire are not going to let inimical financial interests ruin it."

The Kiwanis Club also passed a resolution urging speedy adoption of the plan and called on the 1,500 other Kiwanis Clubs throughout the nation to adopt similar resolutions "as bond and stockholders in almost every state are affected." Similar action previously had been taken by the Rotary Club, the Berlin City Council and the Coos County Board of Commissioners. Strengthening these resolutions was a statement issued by the General Creditors' Committee of Boston, representing more than $800,000 of the $1,530,462 in unsecured claims, urging quick approval of the plan.

The Brown Company was forced into trusteeship in September, 1935, under Section 77B. The management recently filed a reorganization plan with the court which showed an earning gain for the first six periods this year of $1,300,000 over a like period last year. Pointing out that present demand for its pulps was 50 per cent in excess of capacity, the plan said that it had interested new money to the extent of $12,500,000 for working capital and expansion as soon as the plan is approved.

Abitibi Preferred Is Favored

In a letter sent to all depositors and holders of preferred stock in Abitibi Power and Paper Company, Ltd., the Preferred Stockholders' Protective Committee, favors the reorganization plan of the Bondholders' and recommends the adoption of that plan at the bondholders' meeting, which, under an order of the Supreme Court of Ontario, has been called for October 15. Included with the letter is a copy of the plan of the Bondholders' Committee and also a memorandum in which the plan is thoroughly examined. The letter states: "A number of plans suggested by the parties, other than the Bondholders' Committee, have been considered by the Preferred Committee and conferences have been held with those sponsoring them. The preferred committee considers none of these plans as satisfactory for the preferred stockholders as the bondholders plan.

"The Preferred Committee has informed the Bondholders' Committee that it approved the plan as at present formulated and will recommend it and support any plan which may be put forward and which the preferred Committee may consider to be preferable from the point of view of the preferred stockholders and which may seem feasible." In the memorandum, after dealing with the features of the Bondholders' Committee plan, the Preferred Committee states that it believes if Abitibi is reorganized according to that plan it "will have a sounder financial structure than would result under any other plan yet submitted."

Puget Sound Pulp Co. Offers Stock

The Bankamerica Company of San Francisco on Tuesday of this week offered, by means of prospectus, a new issue of 125,000 shares of the Puget Sound Pulp and Timber Company 6 per cent convertible cumulative preferred stock of $20 par value at $25 a share, plus dividends from July 1, 1937.

The proceeds of the sale will be used by the company to complete payments on property previously acquired and for the erection of a new sulphite pulp mill thereon. The mill will have an estimated annual production capacity of 40,000 tons of pulp. Upon

completion of the financing, the company's capitalization will consist of 125,000 shares of preferred stock and 249,792 shares of common stock.

According to the prospectus, net income before income taxes, for the five months ended on May 31, amounted to $187,849. Until July 1, 1938, the preferred stock is convertible into common at the rate of 1½ shares of common for each share of preferred, prior to July 1, 1939, at the rate of 1¼ shares of common for each preferred share and after July 1, 1939, at 1 1-9 shares of common for each preferred share.

Great Northern Acquires 59,268 Acres

BANGOR, Me., September 7, 1937—A Supreme Court mandate recorded August 25 in Penobscot county superior court authorizes the Merrill Trust Company of Bangor, trustee, to sell two parcels of land for $300,000 to the Great Northern Paper Company. The property, comprising 59,268 acres of forest land in Piscataquis, Aroostook and Penobscot Counties, was mortgaged by the Orono Pulp and Paper Company as security for bond issues now defaulted.

Proceeds from the sale will be devoted to partial redemption of the issues.

The mandate, recorded by Chief Justice Charles J. Dunn, provides that the deeds to the property when executed and delivered shall vest in the Great Northern Paper Company all rights and title to the huge acreage as completely as a conveyance which the reportive powers of sale or trust indentures themselves specify.

The mandate also states that the sale is authorized to effect "a change of mode to produce the intended effect of said indentures."

Paper Box Co. Profits Up

Corrugated Paper Box Company, Toronto, reports increase in sales volume during the first half of 1937, compared with the first half of 1936, as a result of improvement in general business conditions and increase in cost of raw material which has inspired future purchasing to cover price advances. This "future" buying in the first half, has caused a current slackening in volume of orders which is regarded as only temporary and officials look for good sales volume early in the fall.

Earnings in the first half of 1937 were substantially higher than for the same period of 1936 and with the expected pick-up of favorable business conditions directors look with considerable confidence to the remainder of the year. The installation of additional corrugating machinery earlier in the year has added to capacity. The folding carton division, now operating under Carton Specialties, Ltd., is making satisfactory progress.

Famous Box Co. Leases Building

In order to provide more than 100 per cent additional floor space for his business, to take care of expansion needs, Louis H. Clark of the Famous Paper Box Company and the Interboro Container Corporation has leased the five-story and basement building at 113-21 West Twentieth street, New York City through Spear & Co., acting for the trustees of Series F-1 of the New York Title and Mortgage Company.

The building contains more than 60,000 square feet of space and will be modernized to suit the needs of the new tenant. It formerly was occupied by the Columbia Phonograph interests.

G. P. Genburg Joins Swedish Pulp Co.

G. P. Genberg who has been with Uddeholm Company in Sweden for the past four years in charge of the manufacture of rayon pulp, has joined the Swedish Pulp Company to take over their rayon pulp developments.

Friends of Mr. Genberg will recall that before

G. P. GENBURG

leaving Canada for Sweden, he was with Fraser companies for eleven years. All his friends wish him well.

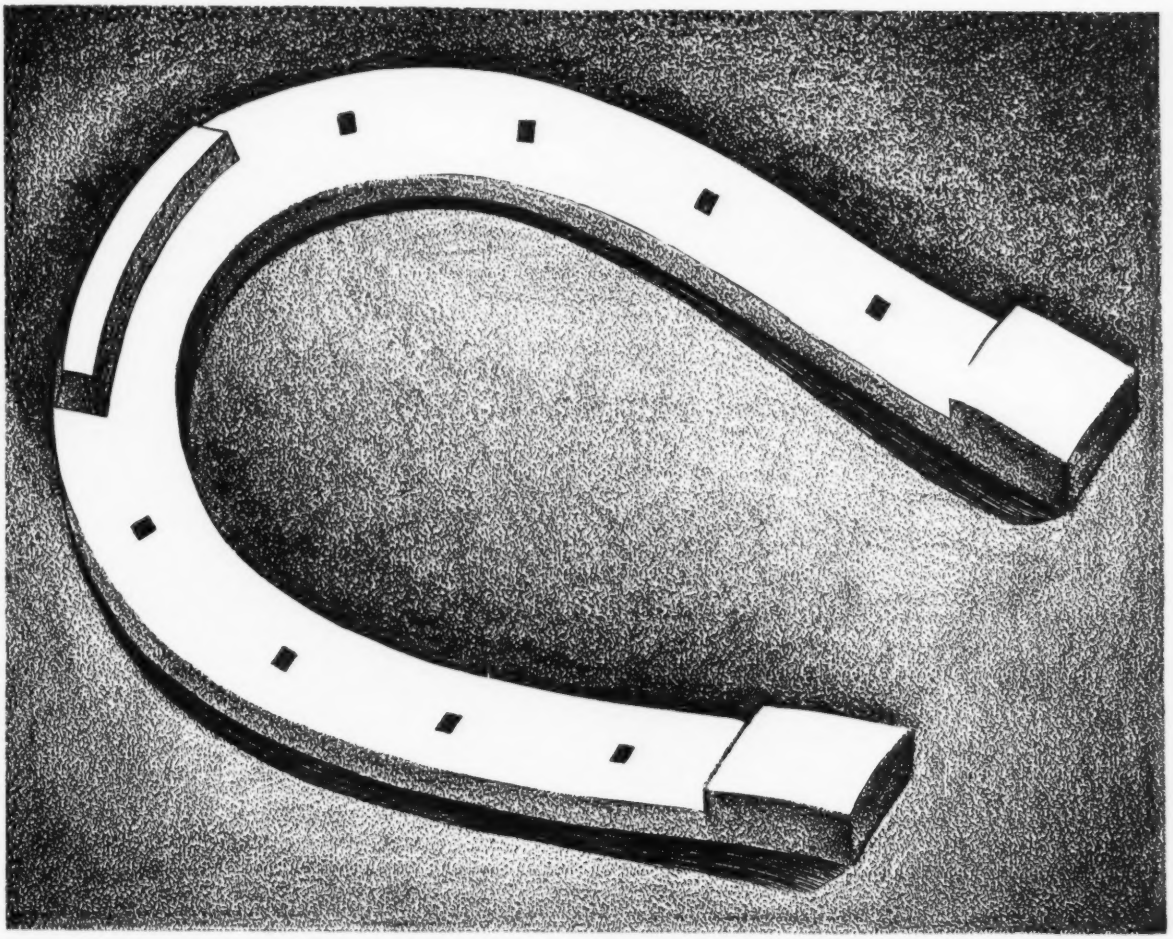
Study Imports of Glassine

That the Customs officials are making investigations of the possible dumping of foreign papers is shown by the fact that the Washington authorities have called on Customs officials at various ports for information as to imports of glassine, M. G. kraft and M. G. sulphite wrappings under the procedure required by the Anti-Dumping Act. When there is prima facie evidence that foreign merchandise is sold for export at less than the prices prevalent in the countries of origin, routine investigations are being made, even though there may be no anti-dumping notice issued later when the issue reaches the Treasury Department higher officials.

Customs officials at various posts are making an intensive study of foreign valuations of glassine since the Import Committee of the American Paper Industry pointed out that the actual sale prices for the American market are not in accord with the cost of production abroad since prices of pulp a dvanced so markedly. Even before this study was initiated the officials had ruled that Swedish glassine was being undervalued.

Fire Damages Eddy Warehouse

KALAMAZOO, Mich., September 7, 1937—Fire in one of the warehouses of the Eddy Paper Company at Three Rivers, Michigan, caused damage amounting to $10,000. The loss was confined to the bales of waste paper stack stored in the building. The Three Rivers fire department was aided by the Kalamazoo and Constantine departments.



It may be a matter of luck . . . or it may be Stowe-Woodward's three generations of specialized experience in the manufacture of Rubber Covered Rolls that accounts for it, but the mills that standardize on Stowe-Woodward Rolls are unusually free from troubles traceable to roll problems. We think we can prove that it is skill rather than chance that makes the difference. May we have an opportunity to prove it?

Meet us in Savannah for Tappi Convention October 18 - 19 - 20

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Indianapolis Demand Improves

[FROM OUR REGULAR CORRESPONDENT]

INDIANAPOLIS, Ind., September 7, 1937—The end of the vacation season and the near date for opening schools and colleges in the state gave the fine paper business an impetus during the last week that bids fair to bring to and end a rather dull summer. Prices have continued firm on ledgers, bonds, books and covers and there is no indication of any radical changes at the present time. Sales with the wholesale houses during the week were brisk and inquiries point to further business.

Some of the hottest weather of the summer this week, coupled with the three-day holiday at the week-end, caused a belated increase in demand for summer specialties, particularly paper plates, cups, napkins and similar merchandise. Due to cool weather most of the summer, these lines have not moved as rapidly as desired.

More activity has been noted in newsprint demand during the past two weeks, much of it due to the approaching change in seasons, it is believed. Local shipments to out-state papers have increased and lineage is said to be increasing also. Printers report a large amount of direct by mail literature in prospect for the fall season, with some contracts closed and others nearly ready for closing.

The paper container field is showing some increase. For a time during the summer, strikes and other influences had caused many industries in the paper container consuming field to curtail, or stop entirely, production. Most of this has been eliminated and these industries gradually are increasing production.

Paper stock continued strong here this week with mill demand fairly satisfactory and prices unchanged. The rags situation is rather weak.

Perry W. Lesh, head of the Lesh Paper Company, jobbers here, has been named one of the three co-chairmen to direct the annual finance campaign of the Indianapolis Community Fund.

Potdevin at Printing Exhibit

Occupying larger space than previously, Potdevin Machine Company, of Brooklyn, N. Y., will occupy Booths 132 and 153 at the forthcoming National Printing and Allied Industries Exposition in Chicago to be held from September 11 to 19 inclusive.

Emphasis this year will center on the new Potdevin printing presses and varnishing units. There will be a number of machines in actual operation and the exhibit will also comprise moving pictures and still photographs of Potdevin paper converting units and a number of types of multi-size, multi-color presses, comprising recent refinements in plate-setting methods, ink distribution and power drive. Accessories such as punching, die-ing out, slitting and sheeting units will also be demonstrated.

The Potdevin exhibits will be in charge of Julian Richmond, General Manager, with Chas. F. Schafer and J. Henry Richmond, Sales Manager; Robert Richmond, Assistant Superintendent; Edwin E. Burroughs, Chief Engineer; Paul Bechle, Mechanical Engineer; and Sumner Norton, Chemist, also in attendance.

Tickets of admission can be obtained by writing or telephoning the Potdevin suite, Hotel Stevens, the Potdevin booths at the Colisseum, Chicago or their main office in Brooklyn.

Blake, Moffitt & Towne Move

Of prime importance in today's industrial news of San Francisco is the move which Blake, Moffitt & Towne, large pioneer paper merchants of the Pacific Coast, are making from their First street location to new and more adequate quarters at 599 Eighth street, corner of Brannan. The building, of reinforced concrete construction, consisting of four floors and basement has been completely reconditioned to accommodate the company's large stocks of paper, paper products and twines and to house the sales and executive offices which serve as headquarters for the organization's coastwide chain of fifteen divisions, of which San Francisco is the parent house, having been established here as a pioneer business over eighty years ago.

In planning, every thought has been given to the creation of ideal working conditions so that the new plant, as it stands ready for occupancy, ranks as one of the finest of its kind in the country.

A complete paper testing laboratory, the only one of its kind in the West, is located on the first floor and is equipped with a humidifier to maintain a constant temperature and moisture content. This humidifier also serves an area designed for the storage of special stocks requiring constant atmospheric conditions.

In commenting on the new building O. W. Mielke, general manager of Blake, Moffitt & Towne, stated "This move to new and more adequate quarters was prompted by the needs of an expanding business and a belief in the future of the city in which this Pioneer enterprise was founded over eighty year ago. We are glad to make this announcement to our many friends and customers, for without their continued support and loyalty, the opening of this plant, which ranks with the finest of its kind in the country, could not have been accomplished."

Philadelphia Reports Optimism

[FROM OUR REGULAR CORRESPONDENT]

PHILADELPHIA, Pa., September 7, 1937—With the advent of September and the attendant Labor Day and Jewish holiday, the record of activities is one of optimism in both fine and coarse divisions of the paper trade. While unfortunately a part of these activities concerns itself with labor adjustments, it is none the less true that compared with a similar period of a year ago, it affords not only satisfaction for what is, but encouragement for that which is looked upon as sure to come.

The fine paper branch of the business is, of course, seasonably quiet, but therein lies the opportunity of the waste material dealers, for with a very heavily increased demand on the part of the mills, and at best a meager supply of stock, the advanced prices of recent weeks are steadily and firmly maintained.

Coarse papers are selling actively all along the line, and in this branch prices are firm for all grades.

Joins Frankenberg Bros.

COLUMBUS, Ohio, September 7, 1937—Ralph H. Frankenberg, a former resident in Dallas, Tex., has become associated with his father, L. A. Frankenberg, in the operation of Frankenberg Brothers, paper box manufacturers at 479 S. Ludlow street, according to an announcement by Mr. Frankenberg.

BANISH VARIABLES to make better pulp

All types of cooking systems can benefit through a definite plan of control. Proper instrumentation produces more uniform conditions throughout the digester and helps make successive cooks more uniform.

You will find a comprehensive discussion of successful, up-to-date forms of instrumentation in Bulletin No. 219. Write for a copy. The Foxboro Company, 114 Neponset Avenue, Foxboro, Massachusetts, U. S. A. Branch Offices in 25 Principal Cities.

Digester Instrumentation
TO HELP IN PRODUCING BETTER PULP
Much progress has been made in the effective use of instruments in pulp cooking • This bulletin presents data collected on different types of digesters in commercial operation, and discusses the advantages that may be expected from the different forms of instrumentation
FOXBORO
A REPORT FROM THE PULP AND PAPER DIVISION OF
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BULLETIN NO. 219

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- Acid Concentration
- Forced Circulation
- Liquid Level
- Temperature
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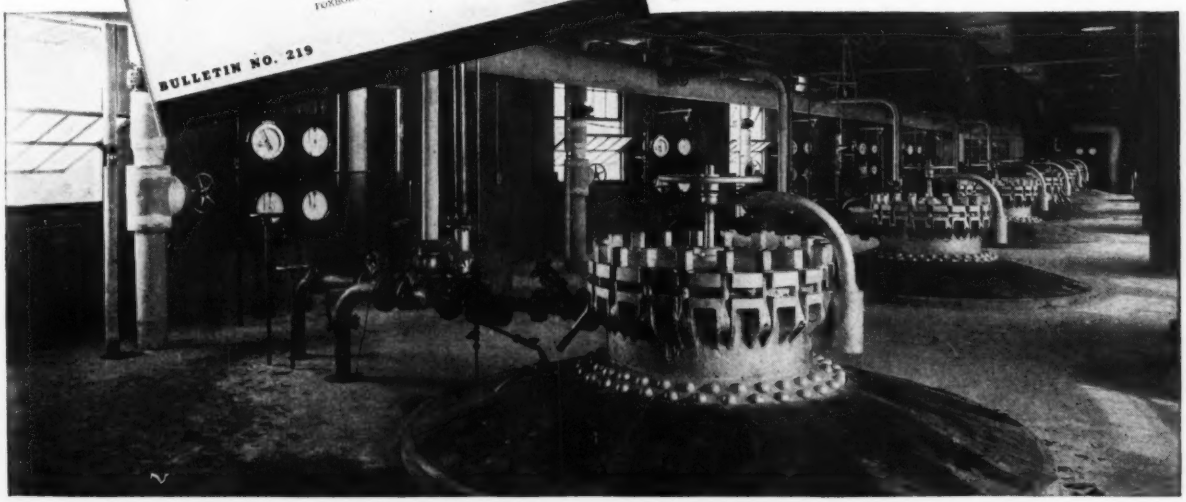

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RESPONSE · ACCURACY

CONSTRUCTION NEWS

A Summary of Vital Facts Regarding Construction, and Operation of Pulp and Paper Mills

General Construction News

Ambler, Pa.—The Keasbey & Mattison Company, manufacturer of asbestos mill board products, asbestos paper goods, etc., has plans maturing for new addition to local plant, comprising a one-story unit, totaling about 143,000 square feet of floor space. It is estimated to cost close to $700,000, including equipment. Superstructure will be placed under way soon. United Engineers and Constructors, Inc., 1401 Arch street, Philadelphia, Pa., is engineer. As recently noted in these columns, company has had plans prepared by the same engineer for new one-story mill at St. Louis, Mo., 120 x 675 feet, to cost approximately $500,000, with equipment. Work on superstructure will be placed under way at once.

Port Edwards, Wis.—The Nekoosa-Edwards Paper Company, Inc., manufacturer of waxed and other processed papers, wrapping paper stocks, etc., has awarded contract to the Wisconsin Bridge and Iron Company, Milwaukee, Wis., for structural steel framing for new two-story addition to mill, about 40 x 40 feet, to be equipped for expansion in bleach department. Work will be placed under way at once. An award for roofing has been let to the Northern Pipe Covering Company, Merrill, Wis. Cost close to $65,000, including equipment.

Roaring Springs, Pa.—The Roaring Springs Blank Book Company, Spang street, manufacturer of commercial paper stocks, blank books, etc., has plans under way for new addition to plant, comprising a five-story structure, 35 x 150 feet, to be used for expansion in paper-converting division and for storage and distributing department. It is estimated to cost close to $100,000, with equipment. Joseph W. Hoover, Keystone Building, Pittsburgh, Pa., is architect.

Pasadena, Tex.—The Champion Paper and Fibre Company, Houston Division, has awarded contract to the Babcock & Wilcox Company, 85 Liberty street, New York, N. Y., for construction of a new recovery plant at local pulp mill. New unit is estimated to cost close to $800,000, with machinery. It is scheduled for completion early in January 1938. Company has closed bids for construction of new pipe line and tunnel for water supply for mill from wells at Magnolia Gardens, near Houston, consisting of a 30-inch welded steel pipe line under the Houston ship channel to Pasadena, about 800 feet long. The line will be laid in a concrete tunnel, 8 x 10 feet, below the ship channel to a depth of about 30 feet. Entire project is reported to cost over $1,500,000. Howe & Wise, Houston, are consulting engineers for the pipe line project.

San Francisco, Cal.—The Schmidt Lithograph Company, Second and Bryant streets, manufacturer of glazed and coated paper products, etc., will build a new boiler plant in connection with six-story and basement addition to paper-converting plant, recently referred to in these columns. Bids have been asked for the boiler house and equipment, estimated to cost close to $50,000, to be located on Sterling street, near Bryant street. Entire project will cost close to $250,000. Jesse Rosenwald, 525 Market street, San Francisco, is engineer.

Chicago, Ill.—The Filter Paper Company, 708 West Madison street, manufacturer of special paper products, processed paper stocks, etc., has leased the three-story building at 57-61 East Twenty-fourth street for a term of years, and will improve and occupy at early date for new plant.

Jacksonville, Fla.—The National Container Corporation, Review and Borden avenues, Long Island City, New York, N. Y., manufacturer of corrugated boxes and containers, has recently let contract to the Jones & Laughlin Steel Corporation, Pittsburgh, Pa., for structural steel framing for new mill at Jacksonville, previously referred to in these columns, and for which superstructure is being placed under way. General erection contract will be carried out by the Merritt-Chapman & Scott Corporation, 17 Battery place, New York. Steel requirements for the different plant units will total about 800 tons. New mill will be equipped for a capacity of about 200 tons of kraft paper per day and is estimated to cost $3,260,000, with machinery. A new container-manufacturing plant will be established in conjunction with the mill, to represent a cost of more than $100,000. Samuel Kipnis is president. Johnson & Wierk are consulting engineers.

Niagara Falls, N. Y.—The Gilman Fanfold Corporation, Ltd., Buffalo avenue and Tenth street, manufacturer of paper specialties, affiliated with the Moore Corporation, Ltd., 330 University street, Toronto, Ont., has plans for new one-story plant addition, estimated to cost close to $50,000, with equipment. Bids have been asked on general contract and it is proposed to begin erection early in the fall. E. G. Baker is president.

Kalamazoo, Mich.—The Detroit Paper Products Corporation, 5800 Domine street, Detroit, Mich., manufacturer of corrugated shipping containers and allied paper products, is making ready for extensive operations at new mill at Kalamazoo, formerly the plant of the Western Board and Paper Company, recently acquired, as previously referred to in these columns. Improvements are being made and facilities

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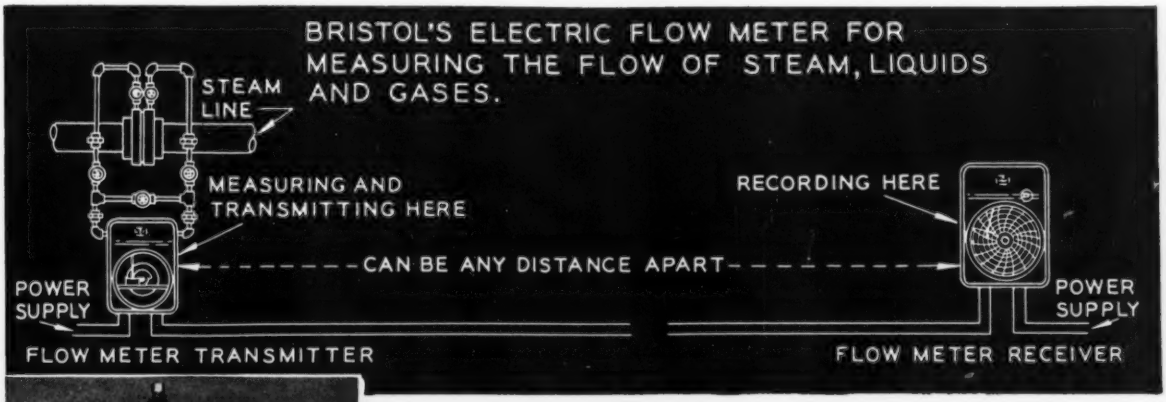
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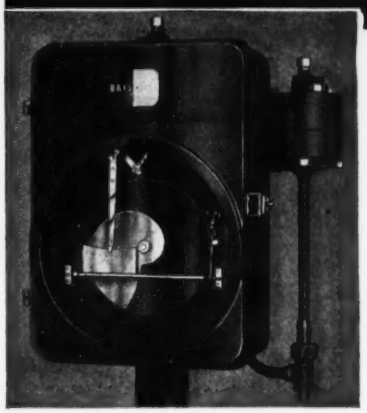

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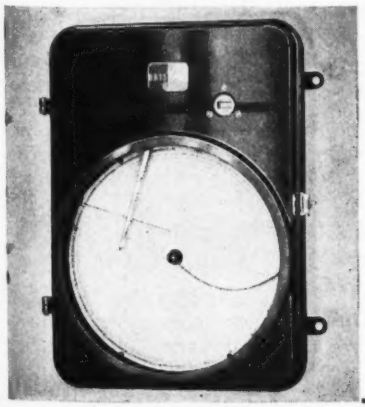

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will be provided for a capacity of about 100 tons of liner board and chip board per day. Plant will be used for company requirements for raw material for fabrication and conversion at plant at Detroit. Seymour H. Franklin is president.

Spring Hill, La.—The Southern Kraft Corporation, 220 East 42nd street, New York, N. Y., through its subsidiary, Webster Development Company, has awarded a contract to the McGregor & Pickett Company, Little Rock, Ark., for a large housing development at Spring Hill, vicinity of Shreveport, La., for employees of new mill to be located at that place, where large tract of land was acquired last June, to which reference has been made previously in these columns. The mill village will consist of a group of dwellings and several public buildings, and is estimated to cost close to $1,500,000. Work is scheduled to be placed under way at once. Erection of initial mill buildings will proceed in the fall, with plant to be completed in 1938. It will be equipped for a capacity of about 220,000 tons of kraft paper and paper board products per annum, and will represent an investment of close to $7,000,000. Company is a subsidiary of the International Paper Company, first noted address.

Adelaide, Australia—The Australasian Cellulose Manufacturers, Ltd., Adelaide, South Australia, recently organized, has acquired property in the vicinity of the city as site for new plant for the production of paper specialties, building board, paper board and kindred specialties. New mill will comprise several one-story units and will operate under a special process for the manufacture of brown cellulose from straw. It is estimated to cost over $150,000, with equipment.

Tumen, Korea—The Oriental Pulp Manufacturing Company, Ltd., Tokyo, Japan, operating with a capital of 10,000,000 yen (about $2,900,000 U. S. currency), has plans maturing for construction of a new pulp mill in the vicinity of Tumen, on the Korean border, where large tract of land has been selected. Plant will consist of several one and multi-story units, with power house and pumping station, and will be equipped for an initial capacity of 10,000 tons per annum. It is reported to cost over $750,000, with equipment.

Liverpool, England—The Gypsum Company of Ireland, Ltd., 2 Old Church Yard, Chapel street, Liverpool, has plans under way for construction of new plant in the Irish Free State, where tract of raw material property has been acquired. Plans will be used for the production of gypsum board and kindred specialties, consisting of several one-story units, equipped for large capacity. It is reported to cost over $350,000, including machinery. L. W. Carder, Ellesmere, Seabank road, Heswell, Cheshire, England, manager, will be in charge of plans and erection.

Bulletin of Mill Cleaning

A Manual of Paper Mill Cleaning Operations has been issued under the above title by the Magnus Chemical Company of Garwood, N. J., manufacturers of industrial cleaning materials. The bulletin lists two new products, one of which is Magnus Feltex, which is used for felt cleaning. The other item is Magnus Beatex, a chemical which is stated to promote defibering and improves flocculation and formation in paper or board.

Obituary

Richard B. Rising

[FROM OUR REGULAR CORRESPONDENT]

GREAT BARRINGTON, Mass., September 7, 1937. Richard Bradley Rising, 52, executive and director of the Rising Paper Company of Housatonic died Sunday night at his home here. He had been active in the paper manufacturing business for 37 years.

Mr. Rising was born in Springfield, Mass., in 1885, son of the late Mr. and Mrs. Bradley D. Rising a well known paper manufacturer with mills in West Springfield. He graduated from Williams College in 1908 and from the Sheffield Scientific school of Yale University in 1910 after which he resided in Great Barrington.

Besides his widow, Mrs. Minette (Downes) Rising, he leaves three daughters, Mrs. Seldon G. Hooper of Coronado, Calif., Mrs. Kirk Willis of Cleveland, Ohio and Miss Edith F. Rising of Great Barrington; one son, also of Great Barrington, one sister Mrs. Charles W. Bosworth of Springfield and two cousins, Horace A. Moses of Springfield and Howard H. Reynolds of Adams, N. Y. The funeral was held this afternoon at St. James Episcopal church. Rev. Dr. C. M. Tower officiated and burial was in Elmwood cemetery. The honorary bearers were Charles W. Bosworth and Horace A. Moses of Springfield, O., A. Miller of Columbus, O., Howard H. Reynolds of Adams, N. Y., and John W. Vivian of Boston.

Howard E. Beedy

Howard E. Beedy, vice president and treasurer of the Oxford Paper Company, died of a heart attack Friday of last week at his home, 480 Park Avenue. He was 47 years old.

Mr. Beedy was born in Phillips, Me., and was educated at Phillips Academy, Andover, Mass., and at Yale University, graduating from Yale in 1915. During the World War he served in France and was regimental adjutant with the rank of captain with the 156th Pioneer Infantry.

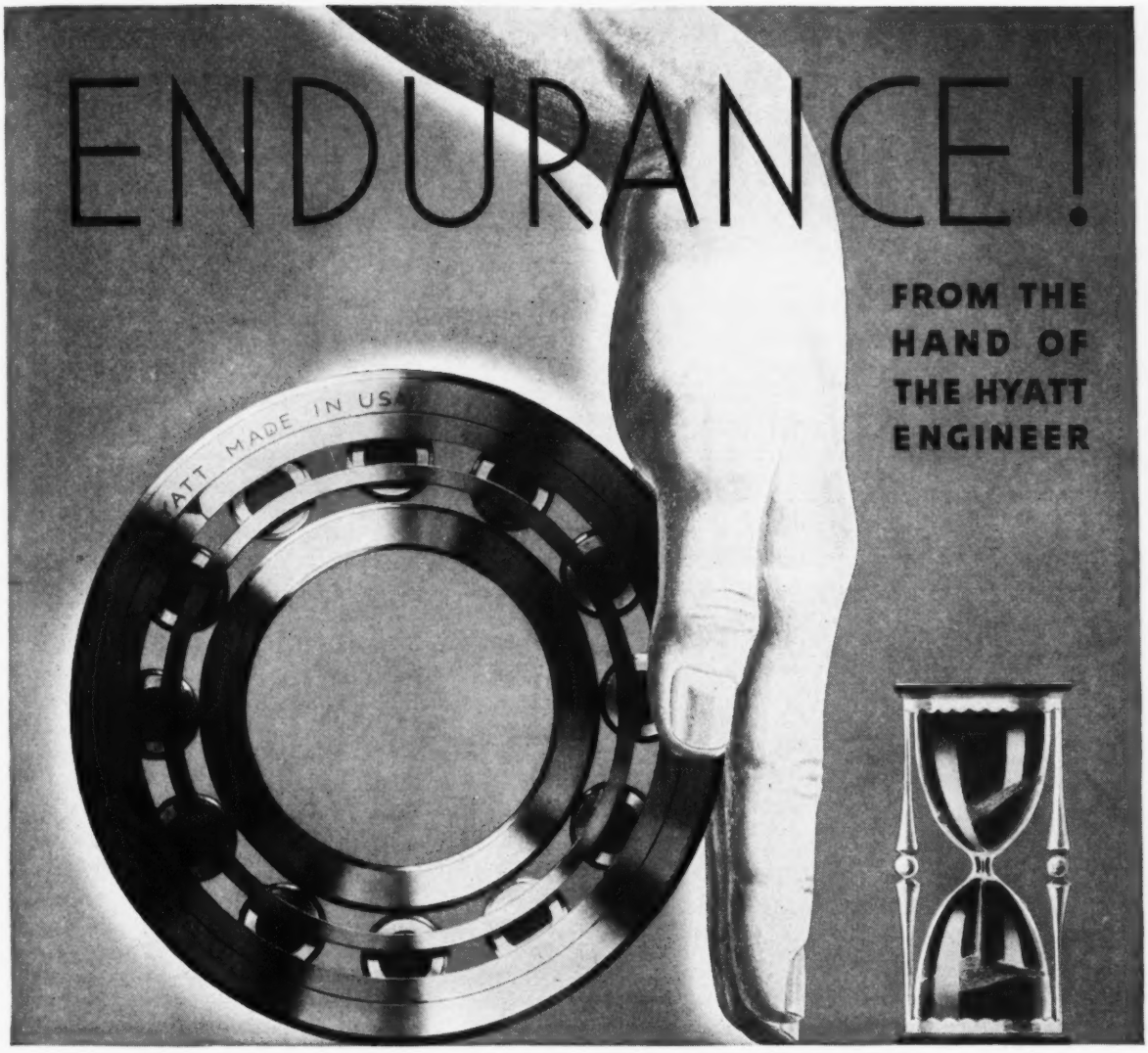
Surviving are his widow, the former Miss Dorothy E. Lane, and a brother, Carroll L. Beedy, who for fourteen years was a member of Congress from Maine.

Elk Paper Mfg. Co. Burned

The plant of the Elk Paper Manufacturing Company at Childs, Md., was struck by lightning and damaged by fire late last month. The cupola was destroyed and the roof of the building badly damaged. A lot of baled scrap paper was fired and some of the machinery was damaged. A lot of the furniture in the office was also damaged, the lightning evidently having followed the telephone wires down through the building. The loss is estimated at several thousand dollars.

Central Ohio Made Hamilton Agent

W. C. Hamilton & Sons, Miquon, Pa., have appointed the Central Ohio Paper Company, Cleveland, Ohio, as agent for their Italian Pressed Book and Cover.



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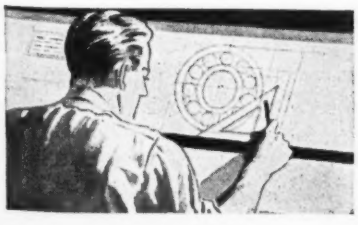

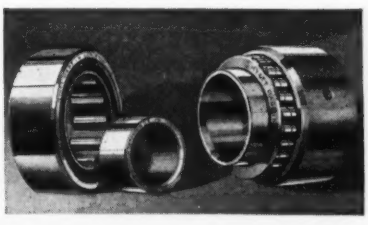

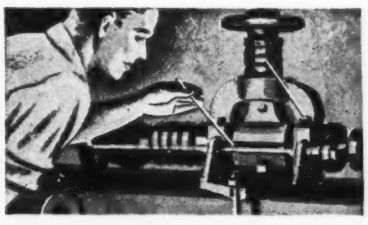

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Vol. CV New York, September 9, 1937 No. 11

COMING EVENTS IN THE PAPER INDUSTRY

TECHNICAL ASSOCIATION OF THE PULP AND PAPER INDUSTRY—Fall Convention, DeSoto Hotel, Savannah, Ga., Oct. 18-20, 1937.

NEW ENGLAND SECTION, Technical Association of the Pulp and Paper Industry—Third Friday of each month at the Nonotuck Hotel, Holyoke, Mass.

DELAWARE VALLEY SECTION, Technical Association of the Pulp and Paper Industry—Second Friday of each month at the Engineers Club, Philadelphia, Pa.

LAKE STATES SECTION, Technical Association of the Pulp and Paper Industry—Second Tuesday of each month at the Conway Hotel, Appleton, Wis.

KALAMAZOO VALLEY SECTION, Technical Association of the Pulp and Paper Industry—First Thursday of each month at the Park-American Hotel, Kalamazoo, Mich.

COURT DECISIONS EXPECTED TO RELAX SEVERITY OF PRICE LEGISLATION

The prediction that court decisions will progressively relax the severity of price legislation, notably the Robinson-Patman Act, possibly even with the paradoxical result of completely reversing the avowed purpose of these laws to suppress the chain store, is made in "Business Under the New Price Laws," by Burton A. Zorn and George J. Feldman, just published by Prentice-Hall.

Mr. Zorn is general counsel for the N. Y. State Labor Relations Board and was chief of trade practice, compliance division, and counsel for NRA in New York State. Mr. Feldman, a Washington attorney specializing in trade commission practice, was formerly with the Federal Trade Commission. Economic collaborator in preparation of the book was Saul Nelson.

Characterizing the Robinson-Patman Act as legislation that "combines breadth of application with minuteness of control and vagueness of implication" and expressing doubt as to the economic desirability of resale price maintenance legislation, the authors outline in detail the history and ramifications of the various price laws and examine the dangers to be encountered and the precautionary measures to be undertaken.

The resale price maintenance laws which have been enacted in forty-one states the authors describe as a "far more direct and more questionable approach" to the problem than is the Robinson-Patman Act.

Examining the Robinson-Patman Act, the authors observe that, in its quest to regulate each individual sales transaction, the Act sets up a minuteness of control that is of revolutionary proportions, but, paradoxically, expresses this control frequently in ambiguous and conflicting terms. The consequence is that "the business man is forbidden to do many things and required to perform many others; but neither that which is forbidden nor that which is required is clearly defined. He may find himself violating the law when he is most scrupulously attempting to obey it; and, conversely, he may find that actions which he considered of doubtful legality are perfectly proper."

Anticipating the argument that earlier antitrust legislation established standards no more specific than the recent legislation, yet provided useful guides, the authors cite two important differences which, they imply, will have profound influences on the application of the price laws:

"In the first place, both the Sherman and Clayton Acts had a well-defined philosophy that met with almost unanimous public approbation—the belief that monopoly was evil and should be curbed. The Robinson-Patman Act, on the other hand, has a purpose far more debatable, and about which thinking men differ freely—the suppression of the chain store. Equally disputable is the question whether the avowed purpose of the Act can be achieved or whether, in terms of actual operation, it will not further weaken the position of the independent and increase the power of the chain."

Similarly of significance, the authors emphasize, is the fact that the older laws applied almost entirely to the business policy of the monopolist, and the vast bulk of business enterprises was entirely unaffected by their provisions, whereas the Robinson-Patman Act affects the policy of almost every concern in the country whose business may be classed as interstate.

Proceeding into an analysis of the provisions of the Act, Zorn and Feldman observe that the most important limitation on the scope of the Act is inherent in its purpose.

"The sponsors of the Act," they maintain, "were not interested in preventing price discrimination as such, but in preventing the translation of such price discrimination into a competitive weapon. The paramount object was to prevent mass distributors from underselling independents on the retail market; this was to be accomplished by limiting or eliminating the buying advantage which concentrated buying power had been able to secure. Consequently the Robinson-Patman Act prohibits only those price discriminations which have an injurious effect on competition, or which are likely to have such an effect. Where no such injury, actual or probable, is present, price dis-

crimination, no matter how great, is not declared unlawful. Liability hinges entirely upon the 'effect' which may be traced to the discrimination practiced."

The determination of the degree of competitive injury required will be one of the most difficult problems of judicial construction, the authors predict. Analyzing examples actual and hypothetical, they conclude that the Robinson-Patman Act will not have the far-reaching effect on marketing practices contemplated by its sponsors.

Turning to permissive phases of the Act, Zorn and Feldman counsel manufacturers that the right of customer selection offers a solution for many of the perplexing problems created by the Act. Thus, they observe, manufacturers who do the bulk of their business with chain stores may find it advantageous to cut out all their dealings with wholesalers or small retailers and relieve themselves of the difficult problem of determining the proper price differentials. Similarly, the privilege of customer selection offers a solution for manufacturers troubled with questions of granting allowances or furnishing facilities on "proportionately equal terms."

Attacking the issue of the privilege of meeting competition, the authors take exception to remarks made by Congressman Utterback and predict that his "narrow interpretation" will not be supported by the courts. The Congressman contended that it is only lawful price discrimination—that is, competitor's prices which are justified by lower production costs—which can be met. Zorn and Feldman retort that if the courts adopt such construction as this, they would compel a seller in every case to be the judge of the legality of his competitor's prices. Hence their conviction that, "apart from the clear meaning of the proviso, the courts will also consider the business necessities and will in all probability reject the rigid and impractical test suggested by the Congressman."

In the field of quantity discounts, according to the authors, the complexities involved in cost calculations must inevitably lead to very serious difficulties in enforcement of the provisions of the Act. Cost accounting techniques, they point out, may be found sufficiently flexible to justify wide variations in price to competing buyers, and if NRA experience is any criterion, many cases will arise in which "fundamental substantive issues of legal, social and economic policy will masquerade as technical debates between opposing cost accountants." In this connection, they point out that since many discount structures are the result of competitive pressure or historical development, they do not in many instances bear any real relationship to demonstrable cost savings, and hence the authors counsel the seller who seeks to make his practices conform to the law to examine his discount structure and eliminate immediately those discounts which clearly appear to exceed maximum savings, by whatever theory of accounting he adopts.

Production Ratio Report

These statistics are based upon production reports to the American Paper and Pulp Association:

COMPARATIVE MONTHLY SUMMARIES

Months	1937	1936	1935	1934
January	90.3% (c)	76.1%	65.8%	.....
February	90.1% (c)	77.9%	70.0%	.....
March	90.3% (c)	76.0%	70.5%	.....
April	92.1% (c)	82.3%	70.0%	.....
May	90.6% (c)	81.6%	69.4%	.....
June	87.6% (c)	80.7%	72.3%	.....
July	82.4% (c)	77.3%	64.9%	.....
August	82.9% (c)	81.5%	70.9%	.....
September	.....	80.5%	71.9%	58.2%
October	.....	87.6%	75.6%	64.7%
November	.....	88.0%	75.3%	61.7%
December	.....	85.9%	71.2%	59.6%
Year Average	.....	81.3%	70.5%	.....
Year To Date First 34 weeks	88.3% (c)	79.0%	69.2%	.....

COMPARATIVE WEEKLY SUMMARIES

CURRENT WEEKS, 1937		CORRESPONDING WEEKS, 1936	
*August 7	83.1%	August 8	80.2%
*August 14	82.8%	August 15	80.9%
*August 21	86.6%	August 22	81.4%
*August 28	80.0%	August 29	83.5%

The following statistics show the number of mills reporting by ratio groups:

	Number of Mills Reporting, Current Weeks			
Ratio Limits	Aug. 7, 1937	Aug. 14, 1937	Aug. 21, 1937	Aug. 28, 1937
0% to 50%	66	76	66	50
51% to 100%	244	228	241	169
Total Mills Reporting	310	304	307	219

* Subject to revision until all reports are received.
(c) Basic capacity data have been adjusted to correspond with ratings reported on January 4, 1937 Machine Improvement Survey.

PAPERBOARD OPERATING RATIOS

According to reports from the National Paperboard Association, per cents of operation, based on "Inch-Hours," were as follows:

Mos.	1937	1936	1935	1934	Mos.	1937	1936	1935	1934
Jan.	80% (e)	61%	61%	....	July	67% (e)	69%	59%	....
Feb.	86% (e)	67%	67%	....	Aug.	....	75%	65%	....
Mar.	87% (e)	68%	67%	....	Sept.	....	76%	69%	62%
Apr.	89% (e)	70%	61%	....	Oct.	....	82%	76%	63%
May	86% (e)	68%	61%	....	Nov.	....	79%	70%	56%
June	75% (e)	68%	65%	....	Dec.	....	74%	60%	52%

Week end. Aug. 7, 1937—73%
Week end. Aug. 14, 1937—75%
Week end. Aug. 21, 1937—73%
Week end. Aug. 28, 1937—74%

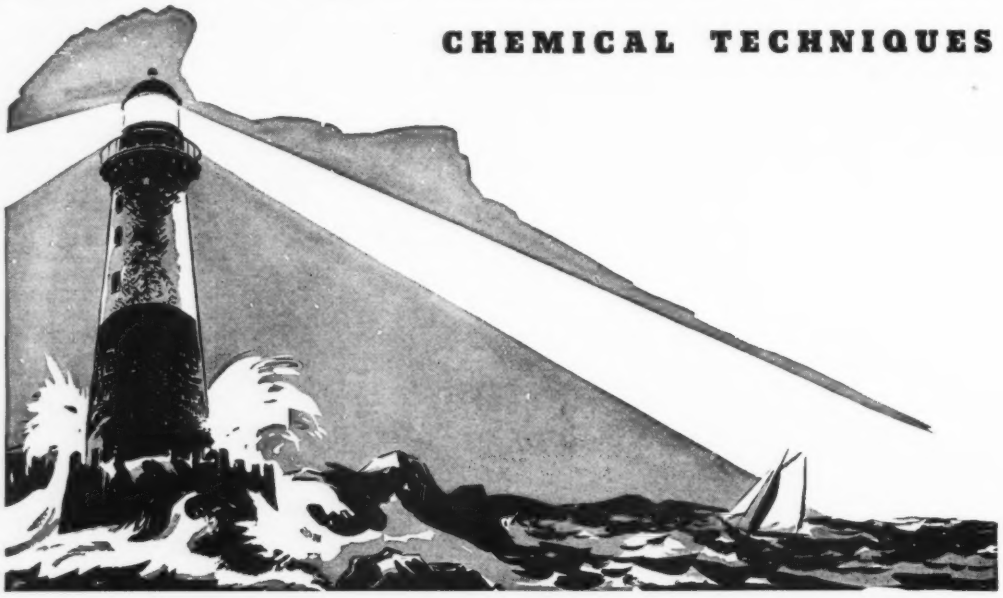
(e) Basic figures revised to include new members of the National Paperboard Association.

Pulpwood Operators Active

[FROM OUR REGULAR CORRESPONDENT]

GLENS FALLS, N. Y., September 7, 1937—Considerable activity is noted this summer in pulp wood operations in the Adirondacks north of here and several of the largest paper mill concerns are securing choice cuts. A contractor has a large force working near the Glen hewing 500 cords and it is said that this is to be trucked to the Mechanicsville plant of the West Virginia Pulp and Paper Company. In a section from Wevertown to the Glen another contract of several hundred cords is being filled for the Ticonderoga mill of the International Paper Company. Other large crews are obtaining good-sized cuts in the region around the Horicon and Friends Lake, these being mostly hard and soft maple, yellow and white birch and some poplar. A North Creek contractor is obtaining large quantities of pulpwood in the Tupper Lake section and trucking it 120 miles to the Corinth branch of the International Paper Company. Another contracting firm, McPhillips Brothers, of this city, are carrying on pulp wood operations in the Friend Lake region for the benefit of industries in Warren county.

•STEADIER GOING—IN THE LIGHT OF CHEMICAL TECHNIQUES



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Section of the
Technical Association of the Pulp and Paper Industry

Edited by Ronald G. Macdonald, Secretary

Nature of China Clays*

By William W. Meyer[1]

China clays are made up of particles of various sizes, resulting from the weathering of certain minerals or rocks. Also present in the clay are impurities such as quartz, mica and feldspar grains. There may occur too, a complex mineral, at present described as sericite-like, which represents possibly a step in the weathering process. Although the kind and amount of impurities in the clay are important for one reason or another, it is the clay particles themselves which most characterize the phenomena peculiar to clays. Of these phenomena probably the ones of greatest interest to the paper industry are those of flocculation and deflocculation. To get a picture of these conditions of a suspension of clay in water we must first have some idea of the nature of the clay particles.

China clay particles are formed by the reaction of weak acids, chiefly silicic acid, and weak bases, chiefly aluminum hydroxide. The ratio in which they combine and the completeness of the reactions vary with the environment, but two typical reactions might be represented by the equations:

(1) $2H_2SiO_3 + 2Al(OH)_3 \rightarrow H(2SiO_3 \equiv 2Al)(OH)_3 + 3H_2O$;
(2) $3H_2SiO_3 + 2Al(OH)_3 \rightarrow H_3(3SiO_3 \equiv 2Al)(OH)_3 + 4H_2O$.

Equation (1) represents the formation of the kaolin minerals having the formula $Al_2O_3.2SiO_2.2H_2O$, one of which (kaolinite) is the chief constituent of china clay. Equation (2) represents the formation of the much less abundant but more active constituent known as beidellite. Its formula is $Al_2O_3.3SiO_2.XH_2O$. If for convenience we let SiO_3 = A and Al = B, we might picture a minute particle of each of these minerals as shown in Fig. 1.

The attached H-atoms and OH-groups are free to ionize in solution, depending upon the environment.

The Isoelectric Condition

Now, it is known that clay particles are most stable when in the isoelectric condition, that is, when the same number of H^+ ions and of OH^- ions are held by the particle, as shown in Fig. 1. It can be seen that the beidellite particle would be isoelectric at a lower pH value than would the kaolinite particle, because the former would require more H^+ ions in solution to suppress the ionization of the hydrogen atoms on the particle. Thus, the higher the ratio of A to B in the particle, the lower will be the isoelectric pH.

In a weathering solution those particles will be formed which are most stable under the weathering conditions. For this reason a clay tends to weather to the composition which will be isoelectric at the pH of the weathering solution. Under favorable conditions a complex ion, such as $(\text{—Al—OH})^+$ will replace H^+ ions held by the particle, thus decreasing the ratio of A to B, and hence raising the isoelectric pH; or a complex ion, such as $(\text{H—SiO}_3\text{—})$—can replace OH— ions, causing an increase in the ratio of A to B, and hence lowering the isoelectric pH of the particle.

It is conceivable that there may be any number of A's and B's, in any ratio, in colloidal clay particles, depending upon the conditions of formation. We are familiar with certain ratios such as those of kaolinite and beidellite because, on combining in these ratios, a stable mineral is formed. It might be added that it has been reported that one noncrystalline kaolin mineral has a variable silica-alumina ratio.

The ionization of the H-atoms and OH-groups and their replacement by other ions, constitutes the method of particle growth. If the replacing ion fits into the particle structure it combines with the particle, taking its proper position. Particle growth may be interrupted not only by changes in environment but by the adsorption of ions which are foreign to the particle structure. The stability of the salts formed by union of different ions with a given clay particle varies widely. The decreasing order of the degree of ionization of these salts for some cations seems to be Na>K>Ca>H>Fe>Al, and for some anions $Cl > SO_4 > SiO_3 > PO_4 > OH$. The Hofmeister series, which takes into account both valence and the nature of the ions, seems to obtain. The order of the stability of the clay salts would be the reverse of that

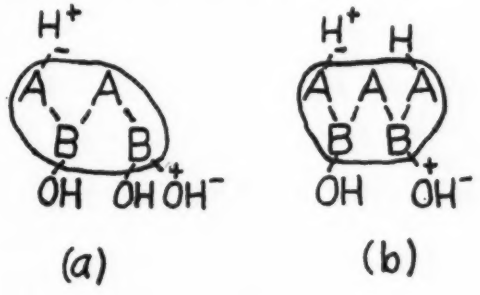

FIG 1.

Portions of clay particles in the isoelectric conditions, showing the effect of the ratio of acidic (A) to basic (B) constituents upon the ratio of H to OH at the surface; (a) kaolinite; (b) beidellite.

* Presented at the Annual Meeting of the Technical Association of The Pulp and Paper Industry, Waldorf-Astoria Hotel, New York, N. Y., Feb. 22-25, 1937.

[1] National Bureau of Standards, Washington, D. C.

This paper is composed chiefly of excerpts from one titled "Colloidal Nature and Related Properties of Clays," by W. W. Meyer, NBS J. Research, 13, 245-58, 1934. R.P. 706.

given above. The stability of Na-clay is about the same as that of clay-Cl, but H-clay is much less stable than clay-OH.

Base Exchange Capacity

The capacity of a clay to adsorb the above indicated cations is called base exchange capacity, and is expressed in milliequivalents per 100 grams of clay. It increases with the pH, starting from zero at the pH of exchange neutrality, at which point the clay particles adsorb equal numbers of the cations and anions of a neutral salt and the two cancel each other in effect.

Below the pH of exchange neutrality we have anionic exchange. The question of anionic exchange capacity is not settled. Such exchange has been reported, but since it occurs, in the case of china clays, at values starting near pH 3 and increasing with decreasing pH, we can probably disregard its academic value and assume it to be of little importance to the paper industry.

Since base exchange capacity is dependent upon the condition of the surface of china clay particles it follows that the greater the specific surface, that is the smaller the average particle size, the greater will be any effect depending upon exchange capacity. It can be seen from Fig. 1 that beidellite has a greater base exchange capacity per unit particle surface than has kaolinite. The higher the ratio of A to B the greater will be the exchange capacity of china clays of a given particle size.

Let us see what part the adsorbed bases play in determining the condition of a clay-water suspension. To summarize what has been said and to get a better picture of the actual conditions, we may say that the surface of the clay particle is covered more or less thickly, depending upon its composition and the pH of its suspension, with a layer of positive and negative ionic charges. The algebraic sum of these charges is positive when the pH of the surrounding solution is below the pH of exchange neutrality, making possible anionic adsorption, and negative when the pH of the solution is above this pH, the condition which most concerns us, making possible adsorption or attraction of cations. Outside this layer of ionic charges is the second layer composed of an atmosphere of adsorbed and unadsorbed diffusible ions, bringing the micelle, as the whole is called, into equilibrium with the surrounding or intremicellar solution according to the Donnan equilibrium equation,

$$x^2 = y\,(y + z)$$

where:

x = ionic concentration of the cations and of the anions in the intermicellar solution (total = 2x)

y = ionic concentration of the cations and of the anions in the micellar solution (total = 2y)

z = ionic concentration of the adsorbed ions, i.e., the ions whose charges are attracted by the clay particle.

This condition of equilibrium might be represented as in Fig. 2.

The water in the micellar solution held by the ion atmosphere of the particle is termed water of osmotic imbibi-

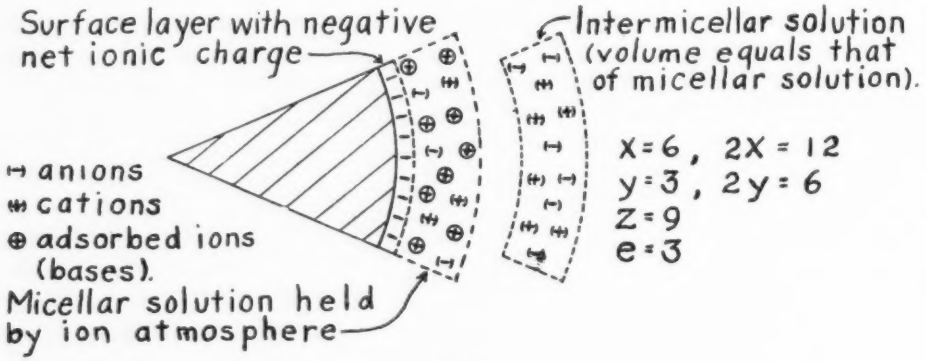

FIG. 2.

Donnan equilibrium condition.

tion. The thickness of this layer of water depends upon the ion atmosphere. It is evident that

$$2y + z - 2x = e = \text{excess micellar ions},$$

therefore, since the osmotic pressure in the micelle is proportional to the excess (e) of ions present, it can be seen that a decrease of "z" caused by substitution of an ion lower in the Hofmeister series for one higher in the series or an increase in "x" ("z" remaining constant) caused by addition of free electrolyte to the intermicellar solution, would reduce the amount of imbibed water per unit surface of the particle.

It is the condition of this imbibed water layer which determines whether the clay in a suspension will be flocculated or deflocculated. If the layer is sufficiently thick so that particles will be held too far apart to attract one another molecularly then the clay will be deflocculated. If the layer is thin enough to allow the clay particles to come within the range of molecular attraction of one another, the clay in suspension will be flocculated.

The kind of cations present not only affects the amount of imbibed water but determines the nature of coagulation. In the case of a polyvalent-ion two or more particles are held together by one cation and "chain coagulation" occurs as follows:

$$(OH)_3(2B \rightleftharpoons 2A)—Ca—(2A \rightleftharpoons 2B)\ (OH)_3.$$

To show the application of the foregoing theory to the paper industry let us see what happens when $Al_2(SO_4)_3$ is added to a clay-water suspension at pH_7, deflocculated with NaOH. The Al^{+++} replaces the Na^+ held by the clay and the SO_4-- neutralizes the displaced Na^+. Further addition of $Al_2(SO_4)_3$ increases the concentration of the Al^{+++} in the intermicellar solution while hydrolysis of this ion ($Al^{+++}+3H_2O \rightleftarrows Al(OH)_3+3H^+$) lowers the pH value of the suspension and flocculation results. Chain coagulation takes place due to the polyvalence of aluminum. In the presence of negatively charged pulp fibers the Al^{+++} ions act as bonds not only between the clay particles but also between the clay particles and the pulp fibers. The result is what workers in paper chemistry term "coflocculation."

A Theory of Paper Drying*

By E. Cowan[1] and B. Cowan,[2]

Abstract

The authors develop theoretical formulas for predicting the performance of paper-drying machines and compare the results obtained by using these formulas with representative machines now in use. The paper includes a discussion of (1) the problems met with in the paper-making industry and how these problems can be dealt with theoretically in an effort to predict the performance of drying machines and (2) fundamental equations which can be used in designing and perfecting new equipment.

Nomenclature

The following nomenclature is used in the paper:

A_s = total surface area of a strip of drier shell 1 ft. wide, sq. ft.
A_r = total area of cylindrical surface of drier drum, sq. ft.
A_u = uncovered surface area of a strip of drier shell 1 ft. wide, sq. ft.
A_v = total uncovered surface area of a single drier drum, including the ends, sq. ft.
C = contact length on a drier shell, ft.
c_1 = conductivity coefficient of the shell material, Btu. per sq. ft. per deg. F. per in. per hr.
c_2 = conductivity coefficient of the paper, Btu. per sq. ft. per deg. F. per in. per hr.
$D = CK_p/S\,PW_p$
e = weight of water evaporated from 1 sq. ft. of sheet for any given drier drum, lb.
H = thickness of drier shell, ft.
k, k_o, k' = surface coefficients of heat transmission, Btu. per sq. ft. per deg. F. per hr.
K' = coefficient of heat transmission between steam and surface of drier drum, Btu. per sq. ft. per deg. F. per hr.
K_p = coefficient of heat transmission through paper, Btu. per sq. ft. per deg. F. per hr.
l_o = latent heat of vaporization at t_o, Btu. per lb.
M = a constant $= (t_a - t_o)/l_o$.
n and n_e = number of effective driers in a drier bank.
n_p = number of preheating driers in a drier bank.
P = paper thickness, ft.
Q = heat input to any drum, Btu.
Q_e = heat added to 1 sq. ft. of sheet on any given drier drum, Btu.
Q_n = total heat input to n effective driers, Btu. per hr.
Q_p = total heat input to n_p preheating driers, Btu. per hr.
R = a constant $= [(t_a - t_o)/l_o]W_fS_f$
S_f = specific heat of dry fiber, Btu. per lb. per deg. F.
S_s = specific heat of shell material, Btu. per lb. per deg. F.
S_p = specific heat of paper web, Btu. lb. per deg. F.
t_a = surface temperature of a drier shell = maximum paper temperature attained on the drier, deg. F.
t_{a1}, t_{a2}, t_{an} = surface temperature of the preheating driers, deg. F.
t_o = evaporation temperature, deg. F.
T_o = surface temperature of the drier shell at point of contact of the shell and paper, deg. F.
T_d = mean temperature difference between the steam and shell surface.
T_e = surface temperature of the drier shell at point of separation of the shell and paper, deg. F.
T_3 = temperature of sheet leaving the last press, deg. F.
t_1 = steam temperature in the effective driers, deg. F.
t_1' = steam temperature in the preheating driers, deg. F.
t_p' = paper temperature on the preheating driers, deg. F.
V = paper speed, ft. per hr.
V' = paper speed, fpm.
W = width of sheet dried, ft.
W_a = total water evaporated from n driers, lb. per hr.
W_f = weight of bone-dry fiber per sq. ft. of sheet, lb.
W_p = specific weight of paper web, lb. per cu. ft.
W_s = specific weight of shell material, lb. per cu. ft.
x_1 = thickness of drier, in.
x_2 = thickness of paper, in.
x_3 = thickness of felt shell, in.
X = maximum permissible rate of evaporation, lb. of water per sq. ft. of sheet per hr.
Y = water content of paper, lb. per sq. ft. of sheet.
Y_e = water content of sheet on the drum on which the average surface temperature is attained, lb. per sq. ft. of sheet.
Y_1 and Y_f = initial and final values of Y.
Z_o = free interroll space, ft.
ω = angular velocity of drier drum, radian per hr.
ϕ_2 and ϕ_1 = portions of drier shell in contact with paper and uncovered, respectively, radians
π = efficiency of whole drier bank

* Presented at the Annual Meeting of the Technical Association of the Pulp and Paper Industry, Waldorf-Astoria Hotel, New York, N. Y., Feb. 22-25, 1937.

Note: A similar paper was presented at the meeting of the A.S.M.E., New York, in December, 1936.

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1—Theory and Derivation of Equations

Because of the flexibility of the usual paper-drying systems, a strict theoretical analysis of the thermodynamics involved has never been found absolutely necessary for design. It may be said that the paper machine drier has merely evolved to the extent that existing machines have always furnished the necessary criteria upon which new designs were based, and successful operation has always been possible because the different variables such as speed, steam temperature, and volume of air used could always be utilized for adjustment.

The paper machine drier, illustrated in Fig. 1 being ill-adapted to experimentation, it becomes necessary to develop a rational theoretical basis for the drying process in order to achieve optimum operating conditions, and in addition, the accurate prediction of the performance of new machines is highly desirable. It is for this reason that the following analysis has been made.

It should be pointed out beforehand that very few data of an experimental nature were available; the most common fault being the vague and inconclusive manner in which most investigators have described the conditions of their tests.

In making numerical calculations it has been necessary to adopt coefficients which are used under circumstances most closely related to this problem.

A simple way to visualize the drying process is to consider the moist paper web as a cooling coil in contact with the hot drier. Practically all the heat of vaporization is liberated after the sheet leaves the drier; hence, the actual escape of the moisture occurs in a series of explosions. The moist sheet containing from 70 to 75 per cent by weight of moisture enters the drier nest at a temperature of from 60 to 100 deg. F. The first two or three driers heat the moist sheet to the evaporation temperature. The sheet is held in close contact with the shell by means of an endless felt. Heat added to the sheet on the remaining driers, referred to as effective driers in subsequent calculations, is used to evaporate the moisture. The derivation of the formulas in this study is based on the following hypothesis describing the drying cycle on a given drier.

The thin moist paper web enters the drier at the evaporation temperature t_o. It is assumed that very little heat, and in turn moisture, escapes during the contact part of the cycle. Before leaving the drier roll the moist sheet has acquired a temperature approximating that of the sur-

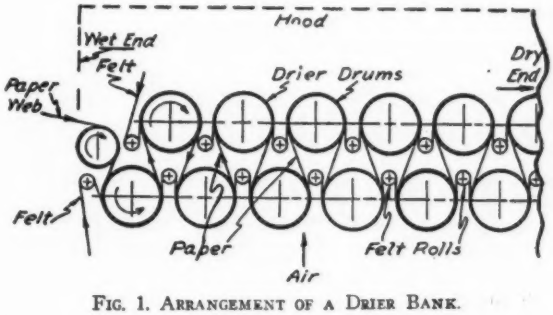

FIG. 1. ARRANGEMENT OF A DRIER BANK.

face of the drier shell. On breaking contact, the sheet begins to cool and evaporation of the entrained moisture takes place. The rate of evaporation is proportional to the difference in vapor pressure between the vapor in the sheet and the vapor in the air in the immediate vicinity of the sheet. It is further assumed that sufficient air at a constant temperature and relative humidity is being supplied to carry away the moisture. The longer the time interval between driers, the greater will be the cooling of the sheet and, hence, the lower the average evaporation temperature. Given the evaporation temperature at a certain speed, the corresponding evaporation temperature t_o may be calculated for other speeds. As soon as the wet paper leaves the shell, the shell tends to become hotter, thus acting as a reservoir for heat that is released when contact is made again. While this difference is only a fraction of a degree, the heat thus stored is of considerable magnitude due to the number of cycles per unit of time. The rate at which water is evaporated must be such that the steam in the sheet escapes without injuring the formation. The maximum permissible rate is governed by the strength or cohesion of the fiber mass necessary to prevent distortion and by the hygroscopic characteristics of the sheet, governed in turn by the freeness, the percentage of sulphite pulp, and the formation of the sheet. This is largely a paper-making, not an engineering, problem and, as the factors are not quantitatively known, the authors have endeavored to choose conditions within the range of known practice. Ignorance of these factors does not affect the validity of the equations given in the paper.

The total pressure of the air-vapor mixture in the drier hood is composed of dry-air pressure plus vapor pressure, each of these being a partial pressure obeying Dalton's law. Doubtless there is a considerable range in evaporation temperatures for any given condition. We are concerned only with an average evaporation temperature. The equations show the relation between all of the important variables.

Scavenging air receives its additional heat from (1) heat recovery through a heat interchanger using the exhaust air-vapor mixture; (2) steam coils when low atmospheric temperatures prevail; (3) the vapor from the sheet which in cooling surrenders some of its sensible heat and causes the dry-bulb temperature of the air to increase; and (4) radiation and convection from the driers.

Air as it leaves the driers will be at about 140 F. and have a relative humidity of from 40 to 50 per cent.

Radiation from the hood itself may cool this air to around 120 F. and increase its relative humidity to 70 or 85 per cent. For the maximum heat recovery, it is obvious that the temperature of the exhaust vapor must be high. For a specific example, there are limits to the temperature of the air supply below which the drying capacity is reduced and above which there is no appreciable increase in the drying rate.

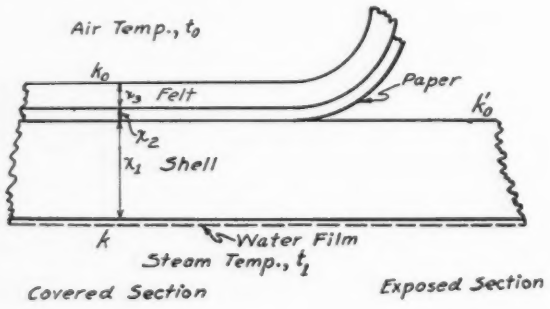

FIG. 2.

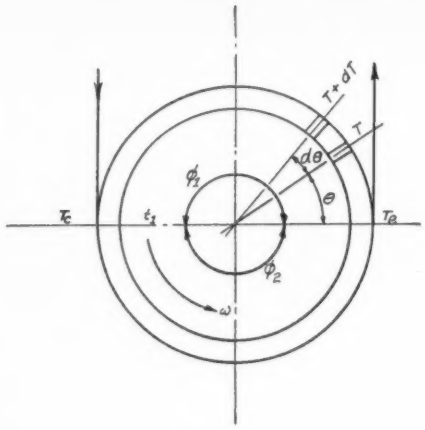

FIG. 3.

CALCULATION OF DRIER SURFACE TEMPERATURE

Consider first the properties of a single drier drum. In all of the following calculations it will be assumed that all surfaces are flat planes, and the effect of the curvature of the drier shell on the heat transmission can be neglected.

Referring to Fig. 2, let x_1, x_2, and x_3 = thicknesses of shell, paper, and felt, respectively, in.; c_1, c_2, and c_3 = corresponding conductivity coefficients, Btu. per sq. ft. per deg. F. per hr. per in.; and k, k_o, k_o' = surface coefficients, Btu. per sq. ft. per deg. F. per hr.

Consider here that the air temperature t_o in the immediate vicinity of the drier shell is the temperature at which evaporation from the sheet takes place.

While the average air temperature in the drier hood is much lower than the actual evaporation temperature t_o, it is a fact confirmed by personal observation that comparatively high air temperatures are obtained close to the sheet, while the air at a distance is much cooler. It may also be shown that most of the heat added to the air-vapor mixture in the drier bank is due to the heat of evaporation of the water. It appears certain, therefore, that in the immediate vicinity of the sheet, the air temperature must be approximately the same as the evaporation temperature. For the sake of simplicity this temperature has also been assumed to exist in the layer close to the uncovered portion of the drier shell. Whether or not this latter assumption is strictly true is a matter of little importance, since the heat quantities involved are relatively small.

The coefficient of heat transmission between the steam and the surface of the shell is

$$K' = \frac{1}{(1/k) + (x_1/c_1)}$$

where K' is the coefficient of heat transmission, Btu. per sq. ft. per deg. F. per hr.

Consider a portion of the shell during a single revolution. Let the surface temperature of the shell be T_e at the point of contact of the shell and paper. As the paper becomes heated, its temperature rises from t_o to t_a, and the temperature of the shell surface falls from T_e to T_s. During rotation across the uncovered portion, the surface temperature rises again from T_s to T_e.

Consider the uncovered portion of the shell, and an element of surface area dA, moving through an angle $d\theta$ in time ds as shown in Fig. 3. The surface temperature of shell at θ is T, and at $\theta + d\theta$ is $T + dT$. Then the heat

transmitted through the shell in the time ds is equal to the heat radiated to the air plus the heat absorbed in raising the shell temperature by an amount dT. The heat transmitted through the shell is

$$K'(t_1 - T)dAds$$

and the heat lost to the air is

$$k_o'(T - t_a)dAds$$

If H = thickness of shell, ft.; W_s = specific weight of shell material, lb. per cu. ft.; and S_s = specific heat of shell material, Btu. per lb. per. deg. F.; then, the heat absorbed in raising the shell temperature is

$$HW_sS_sdAdT$$

and

$$K'(t_1 - T)dAds = k_o'(T - t_a)dAds + HW_sS_sdAdT$$

or

$$ds[(K't_1 + k_o't_a) - T(K' + k_o')] = HW_sS_sdT$$

If the angular velocity of the drum is ω radians per hr., so that $ds = d\theta/\omega$, then

$$\frac{d\theta}{\omega HW_sS_s} = \frac{dT}{(K't_1 + k_o't_a) - T(K' + k_o')}$$

Integrating T from T_e to T_c and θ from 0 to ϕ_1 gives the total change in temperature, that is

$$\int_{T_e}^{T_c} \frac{dT}{(K't_1 + k_o't_a) - T(K' + k_o')} = \int_0^{\phi_2} \frac{d\theta}{\omega HW_sS_s}$$

and

$$\frac{1}{K' + k_o'} \log_e \left[\frac{(K't_1 + k_o't_a) - T_c(K' + k_o')}{(K't_1 + k_o't_a) - T_e(K' + k_o')}\right] = \frac{\phi_1}{\omega HW_sS_s} \quad \ldots\ldots [1]$$

A solution of Equation [1] using actual values and known data shows the relation between T_c and T_e. Consider a 60-in. drier using steam at 10 lb. per. sq. in. gage, and operating at a speed of 1200 fpm. From Fig. 6 it is observed that the evaporation temperature t_a at this speed is 180 F. Also, t_1 = 240 F. k = 2130 Btu. per sq. ft. per deg. F. per hr., *(1)* x_1 = 1.125 in., and c_1 = 313.4 Btu. per sq. ft. per hr. per deg. F. per in., *(4)* so that K' = 246.5 Btu. per sq. ft. per deg. F. per hr. Based on a surface coefficient of 1.34 and a windage factor *(5)* of 4.55, k_o' = 6.1. Other values are: $\omega = [(1200/5) \times 2\pi \times 60]$ = 28,800 radians per hr, $H = x_1/12$ = 0.0938 ft., W_s = 480 lb. per cu. ft., S_s = 0.1189 Btu. per lb. per. deg. F., *(6)* and approximately $\phi_2 = \pi$.

Substituting the foregoing values in Equation [1] it is found that

$$\frac{238.5 - T_e}{238.5 - T_c} = 1.005$$

For a value of T_c = 200, T_e = 199.6 F. Then T_c and T_e are very nearly equal.

Now consider the covered portion of the shell. The heat transmitted through the shell is the difference between the heat carried away by the paper and the heat rejected by the shell. The heat transmitted through the shell during this part of the cycle = $K'T_d(\phi_2/\omega)$ where T_d is the mean temperature difference between the steam and the shell surface. Since T_c and T_e are very nearly equal.

$$T_d = [t_1 - (T_e + T_a)/2]$$

If Y = the water content, lb. per sq. ft. or paper on the drier drum; W_f = weight of bone-dry fiber per sq. ft. of sheet; and S_f = specific heat of fiber, Btu. per lb. per deg. F., then the heat absorbed by 1 sq. ft. of paper in its passage over the drum is

$$(Y + W_fS_f)(t_a - t_e)$$

But, since the paper and shell are held in very close contact, it may be assumed that $t_a = T_e$.

The heat rejected by the shell per square foot of surface is

$$HW_sS_s(T_c - T_a)$$

Then the heat transmitted through the shell is

$$K'(\phi_1/\omega)[t_1 - (T_e + T_a)/2] = (Y + W_fS_f)(T_a - t_e) - HW_sS_s(T_a - T_a)$$

$$T_c[-HW_sS_s + K'(\phi_1/2\omega)] + T_a[K'\theta_1/2\omega(y + W_fS_f) + HW_sS_s] = K'(\phi_2/\omega)t_1 + (Y + W_fS_f)t_a \quad \ldots\ldots [2]$$

By solving Equations [1] and [2] for the two unknowns, the actual values of T_c and T_e can be determined. The differential, however, is so small that large errors in calculation are difficult to avoid. By consideration $T_e = T_a = t_a$, a simpler solution is obtained.

Consider a strip of shell of unit width and let V = surface speed, ft per hr; A_t = total surface area of the shell, sq ft; and A_u area of the uncovered surface, sq. ft. Then the total heat transmitted from the inside of the shell to the surface, which is the sum of the heat carried away by the paper and the heat radiated to the air from the uncovered surface, can be expressed as

$$K'A_t(t_1 - t_a) = V(Y + W_fS_f)(t_a - t_e) + k_o'A_u(t_a - t_e)$$

from which

$$t_a = \frac{K'A_tt_1 + Vt_e(Y + W_fS_f) + k_o'A_ut_e}{K'A_t + V(Y + W_fS_f) + k_o'A_u} \quad \ldots\ldots [3]$$

For any given speed and moisture content of the paper, the surface temperature of any drier shell can be obtained with Equation [3]. Fig. 4, which was plotted from the values given in Table 1, shows the variation in t_a, for the specified conditions over the whole of a given drier bank. The variations in temperature, over the effective driers, follow almost a straight line, and the arithmetic mean of the initial and final temperature is close to the actual mean value. While it is possible to determine the characteristics of a drier bank through a process of arithmetic integration, such as has been performed in Table 1, this method is cumbersome. It has been found sufficiently accurate to consider a representative, or mean, drier, the characteristics of which are an average for the whole drier bank.

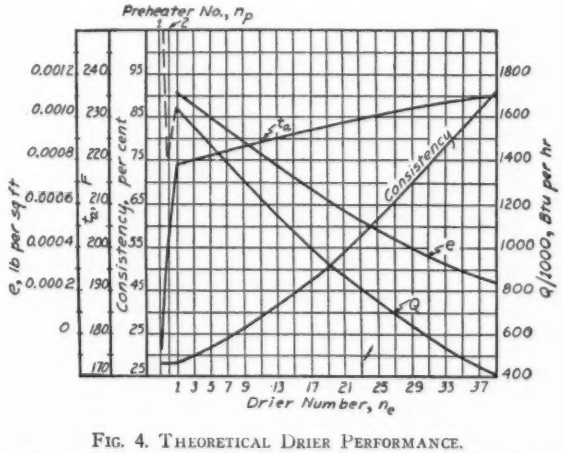

FIG. 4. THEORETICAL DRIER PERFORMANCE.

(The curves are based on the following conditions: Diameter of drier drums = 60 in.; steam pressure in effective driers = 10 lb. per sq. in. gage; steam pressure in preheater driers = 2 lb. per sq. in. gage; initial consistency of paper = 28 per cent; final consistency of paper = 92 per cent; paper speed = 1200 f.p.m.; weight of paper = 32 lb. per 3000 sq. ft. of air-dry paper; width of drum = 20 ft.)

Thus, if t_{as} = the surface temperature of the first effective drier, where $Y = Y_i$, and t_{af} = the surface temperature of the last drier, where $Y = Y_f$, the average temperature

$$t_a = \frac{t_{as} + t_{af}}{2} \quad \text{[4]}$$

In a given machine, operating with a fixed number of drier drums, any variation in speed must be met with changes in the temperature of the drums if the final dryness of the product is to be maintained the same. To effect this, the steam pressure in the drums is changed. Consider, as in the previous example, a 60-in. drier with a shell thickness of 1.125 in. The usual values for the initial and final consistency of the sheet are 28 and 92 per cent, respectively. Using these values, the calculation of the average surface temperature from Equations [3] and [4] shows that an empirical relationship between t_a, t, and V can be obtained which is strictly accurate between the limits set. Thus for the foregoing conditions, the average surface temperature t_a can be represented as

$$t_a = (0.9552 - 0.000144V')t_1 + 0.0314V' + 1.48$$

and for a 48-in. drier

$$t_a = (0.942 - 0.0001616V')t_1 + 0.0354V' + 2.81$$

where V' = speed, fpm. The two equations just given can be used at all speeds between 600 and 1200 fpm, and for values of t_1 usually encountered.

Determination of Paper Temperature

In its passing over the drum, the paper is held in firm contact with the surface of the shell, and the surface resistance to heat transmission is negligible. Also, since the paper is very thin (between 0.003 and 0.007 in.), the average temperature of the paper may be considered as its surface temperature.

Referring to Fig. 5, let C = contact length on the drum, ft; P = thickness of the paper, ft; t_a' = temperature at which the paper leaves the shell surface, F; K_p = coefficient of heat transmission through the paper, Btu per sq ft per deg F per hr; S_p = specific heat of the paper, Btu per lb per deg F per hr; W_p = specific weight of the paper, lb per cu ft. Consider an element of paper of surface area dA. If the felt is considered as a perfect insulator, all of the heat transmitted from the drum to the paper is used in raising the paper temperature from t_o to t_a'. The heat transmitted from the shell surface to the surface of the paper is

$$K_p \frac{t_a' - t_o}{\log_e \frac{t_a - t_o}{t_a - t_a'}} dA \frac{C}{V}$$

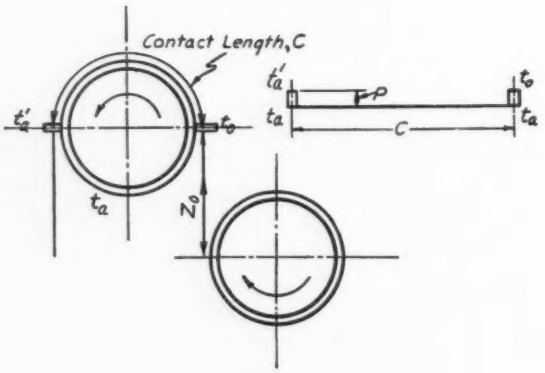

FIG. 5.

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TABLE I.—PERFORMANCE DATA OF PAPER-DRYING MACHINE

Drier no.	Y, lb. per sq. ft.	Consistency, %	t_a, F	e, lb. per sq. ft.	Q, Btu. per hr.
1	0.0252	28.0	219.0	0.00112	1,645,000
2	0.0241	28.9	219.5	0.00109	1,605,000
3	0.0230	29.9	220.0	0.00106	1,561,000
4	0.0219	30.9	220.5	0.00103	1,518,000
5	0.0209	31.9	221.0	0.00100	1,477,000
6	0.0199	33.0	221.5	0.000972	1,435,000
7	0.0189	34.2	222.1	0.000945	1,397,000
8	0.0180	35.3	222.6	0.000916	1,355,000
9	0.0171	36.5	223.1	0.000887	1,316,000
10	0.0162	37.7	223.5	0.000856	1,271,000
11	0.0153	39.1	224.0	0.000827	1,231,000
12	0.0145	40.3	224.5	0.000800	1,193,000
13	0.0137	41.7	225.0	0.000773	1,154,000
14	0.0129	43.2	225.5	0.000746	1,115,000
15	0.0122	44.5	226.0	0.000720	1,082,000
16	0.0115	46.1	226.5	0.000694	1,044,000
17	0.0108	47.8	227.0	0.000668	1,007,000
18	0.0101	49.2	227.5	0.000643	972,000
19	0.00944	50.9	228.0	0.000618	938,000
20	0.00883	52.6	228.5	0.000595	905,000
21	0.00823	54.4	229.0	0.000572	873,000
22	0.00766	56.1	229.5	0.000549	841,000
23	0.00711	57.9	230.0	0.000526	809,000
24	0.00658	59.9	230.0	0.000500	772,000
25	0.00608	61.7	231.0	0.000493	750,000
26	0.00559	63.7	231.5	0.000463	721,000
27	0.00513	65.6	231.5	0.000439	687,000
28	0.00469	67.7	232.0	0.000420	661,000
29	0.00427	69.6	232.0	0.000399	629,000
30	0.00387	71.7	233.0	0.000385	611,000
31	0.00348	73.9	233.0	0.000364	580,000
32	0.00312	75.8	233.0	0.000345	553,000
33	0.00278	78.0	233.5	0.000330	532,000
34	0.00245	80.0	233.8	0.000314	509,000
35	0.00213	82.1	234.0	0.000297	487,000
36	0.00184	84.1	234.3	0.000283	466,000
37	0.00155	86.4	234.5	0.000269	446,000
38	0.00128	88.4	234.8	0.000255	427,000
39	0.00103	90.5 92.5	234.9	0.000242	408,000

Steam required per ton of A.D. paper = 5550 per F. & A.

and the heat absorbed in raising the temperature of the paper is

$$(t_a' - t_o)\, S_p P dA W_p$$

Therefore

$$K_p \frac{t_a' - t_o}{\log_e \frac{t_a - t_o}{t_a - t_a'}} dA \frac{C}{V} = (t_a' - t_o) S_p P dA W_p$$

and

$$\log_e \frac{t_a - t_o}{t_a - t_a'} = \frac{CK_p}{S_p P W_p V} \quad \text{[5]}$$

Consider a speed of 1200 fpm. From Table 1 it is seen that on the twenty-fourth drier the paper has a composition of approximately 60 per cent dry fiber and 40 per cent water, and that t_a = 230 F. The evaporation temperature t_o is 180 F. For a 60. in drier, C = 7.85 ft, approximately. The paper thickness = (0.007/12) ft, the specific weight W_p = 28 lb per cu ft, the thermal conductivity of water (E) = 4, and the thermal conductivity of oak, which may be considered a reasonable value for dry fiber, (6) = 2.5 Using these values, the composite thermal conductivity of the paper c_2 = (4 × 0.4 + (2.5 × 0.6) = 3.1, and the coefficient of heat transmission through the paper $K_p = c_2/x_p$ = 3.1/0.007 = 442.8 Btu per sq ft per deg F per hr.

Similarly, the specific heat of dry fiber S_f = 0.34 Btu per lb per deg F, and the composite specific heat = (0.4 × 1) + (0.6 × 0.34) = 0.604 Btu per lb per deg F.

Substituting these values in Equation [5]

$$\log_e \frac{230 - 180}{230 - t_a'} = 4.89$$

or t_a' = 229.6 F, that is, with the driers in actual use, there is always sufficient time for the paper to attain very closely the temperature of the shell surface. See Figure 9 For computed Paper Temperatures, on-Driers- No. 3, 24, and 39. In the calculations to follow, it will now be considered that the final (maximum) temperature of the paper is equal to the temperature of the drum surface.

Drying Performance of a Complete Drier Bank

Consider any square foot of paper passing over a drier

drum. The heat absorbed by the paper in its passage over the drum is the sum of the heat utilized in evaporating moisture from the paper and the heat radiated to the air in the interroll space. The heat radiated to the air in the interroll space is small enough to be neglected. Then, if e = weight of water evaporated from 1 sq ft of sheet for any given drum, lb; and l_o = latent heat of vaporization at the evaporation temperature t_o, Btu per lb; then, the heat absorbed by the paper in its passage over the drum is

$$Q_e = (t_s - t_o)\ (Y + W_f S_f)$$

and

$$e = \frac{(t_s - t_o)\ (Y + W_f S_f)}{l_o} \qquad [6]$$

If Y_i = the initial water content of the paper entering the drier bank, lb per sq ft; Y_f = final water content of the paper leaving the drier bank, lb per sq ft; Y_2 = water content of the paper on No. 2 drier, lb per sq ft; and Y_n = water content of the paper on the nth drier, lb per sq ft; then, the water evaporated from the paper on the first effective drier is

$$e_1 = \frac{(t_s - t_o)\ (Y_i + W_f S_f)}{l_o}$$

and

$$Y_2 = Y_i - e_1 = Y_i - [(t_s - t_o)/l_o Y_i - [(t_s - t_o)l_o] W_f S_f$$

Since we have assumed an average value for t_a, it can be said that

$$(t_s - t_o)/l_o = \text{a constant} = M$$

and

$$MW_f S_f = \text{a constant} = R$$

Then

$$Y_2 = Y_i(1 - M) - R$$

On drier No. 2, the water evaporated is

$$e_2 = \frac{(t_s - t_o)}{l_o}\ (Y_2 + W_f S_f) = MY_2 + R$$

The weight of water in the sheet leaving the second drier, after complete evaporation has taken place, is

$$Y_3 = Y_2 - e_2 = Y_2\ (1 - M) - R = Y_i\ (1 - M)^2 - R(1 - M) - R$$

Similarly, the water in the sheet leaving the nth drier is

$$Y_{n+1} = Y_i(1-M)^n - R(1-M)^{n-1} - R(1-M)^{n-2} + \cdots - R(1-M) - R \qquad [7]$$

But, if n = number of effective driers in the drier bank, then

$$Y_f = Y_i\ (1 - M)^n - R[(1 - M)^{n-1} + (1 - M)^{n-2} + \cdots + (1 - M) + 1] \qquad [8]$$

If Equation [8] is multiplied by $(1 - M)$ and subtracted from Equation [7], then

$$Y_f M = -Y_i\ (1 - M)^{n+1} + Y_i(1 - M)^n + R(1 - M)^n - R = (1 - M)^n\ (Y_i M + R) - R$$

from which

$$(1 - M)^n = \frac{Y_f M + R}{Y_i M + R}$$

and

$$n = \frac{\log(Y_f M + R) - \log(Y_i M + R)}{\log(1 - M)}$$

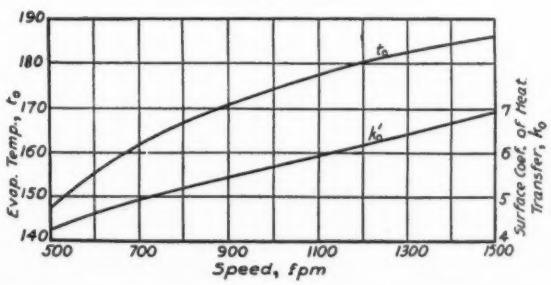

FIG. 6. SURFACE COEFFICIENTS AND EVAPORATION TEMPERATURES AT VARIOUS PAPER SPEEDS.

Substituting for M and R and simplifying

$$n = \frac{\log(Y_f + W_f S_f) - \log(Y_i + W_f S_f)}{\log\ (l_o + t_s - t_a) - \log\ l_o} \qquad [9]$$

Thus, the number of effective driers required can be calculated from Equation [9] if the initial and final moisture content of the sheet, the steam temperature in the shell, and evaporation temperature t_o are given.

EVAPORATION TEMPERATURES

The evaporation temperature is made a function of the machine speed only, and its values may be determined as follows:

At a speed of 1200 fpm the average evaporation temperature is 180 deg F. This value has been determined from the performance data of actual machines, and is assumed as a datum from which to calculate evaporation temperatures at other speeds. It has also been demonstrated that the rate of evaporation increases directly as the air velocity. Carrier *(7)* gives the factor $1 + (V'/230)$. The greater the time interval between driers the greater will be the drop in temperature of the sheet, and the lower will be the evaporation temperature. Then

$$\frac{t_o \text{ at } 1200 \text{ fpm}}{t_o \text{ at } V' \text{ fpm}} = \frac{1 + (V'/230)}{1 + (1200/230)}\ \frac{1200}{V'}$$

and the required evaporation temperature is

$$t_o = \frac{180V'}{193 + 0.84V'} \qquad [10]$$

These values are plotted in Fig. 6. Therefore, values of the evaporation temperature within the usual range can be obtained directly from Fig. 6. It is to be noted that the calculated evaporation temperature is an average temperature. There will be an actual gradient, ranging from a high value of the evaporation temperature at the instant the sheet leaves the drum, to successively lower values as the sheet cools.

The evaporation temperature is considerably higher than the temperature of the air leaving the hood. The water vapor will therefore tend to cool, losing some of its sensible heat to the air, and the actual heat content of the vapor leaving the drier nest will be the sum of the total heat corresponding to the partial pressure of the vapor and the heat in the dry air. The possibility that this vapor contains some superheat may be neglected.

It should be added that the calculated values of the evaporation temperatures are based on an incoming air temperature of 110 deg F, which is the temperature usually found in practice.

PREHEATING DRIERS

As stated previously, the paper leaves the last press at a temperature between 60 and 100 F, and is heated to the evaporation temperature t_o before evaporation of the moisture begins. The driers required for this purpose are called the preheating driers.

Let T_1 = temperature of the paper leaving the last press, F; t_{p1} = final temperature of the paper leaving preheater drier No. 1; and t_1' = steam temperature in the preheating driers. The steam temperature t_1' is usually lower than t_1 because of the fact that rapid heating of the wet sheet causes the fibers to stick to the drum, and also produces a wrinkling of the paper; for this reason, flash steam from the condensate removed from the effective driers is used in the preheating driers. Then, from Equation [3]

$$t_{a1} = \frac{K'A_{s1}t' - V(Y_1 + W_1S_1)(t_{p1} - T_1) + k_o'A_{uo}t_o}{K'A_1 + k_o'A_u} \quad \text{.....[11]}$$

From Equation [5], the actual paper temperature leaving ing drier No. 1 may be determined as follows:

$$\log_e \frac{t_{a1} - T_1}{t_{a1} - t_{p1}} = \frac{CK_p}{S_pPW_pV}$$

For a given set of conditions

$$\frac{CK_p}{S_pPW_p} = \text{a constant} = D$$

Then

$$\frac{t_{a1} - T_1}{t_{a1} - t_{p1}} = e^{D/V}$$

and

$$t_{p1} = \frac{t_{a1}(e^{D/V} - 1) + T_1}{e^{D/V}} \quad \text{.....[12]}$$

Equations [11] and [12] can be solved for t_p.

The number of preheating driers necessary can now be calculated by determining the drier on which t_{pn} is equal or greater than t_o. From this point on, evaporation takes place. For example, take $t_1' = 220$ F (2 lb per sq in. gage), $T_1 = 80$ F, speed = 1200 fpm, and 60-in. driers. From Equations [11] and [12] it is found that $t_{a1} = 176.5$ F and $t_{p1} = 162.5$ F. Similarly, $t_{a2} = 201.5$ F and $t_{p2} = 197$ F. In this case, $t_o = 180$ F, and therefore only two preheating driers are necessary.

Drying Efficiency

The total heat input to a drier drum is the sum of the heat carried away by the moist paper and the heat added to the air by radiation and convection from the uncovered surface. If A_U = total uncovered surface of a single drum, including the ends, sq ft; W = width of dried sheet, ft; and Y_a = water content of the sheet corresponding to the average temperature t_a, lb per sq. ft; then, the heat input to any drum is

$$Q = k_o'(t_a - t_o)A_U + (t_a - t_o)(Y + W_1S_1)VW \quad \text{.....[13]}$$

A curve giving the heat input Q to any drum in a complete drier bank is shown in Fig. 4, from which it may be seen that the drum on which the average surface temperature is obtained will also give approximately the average heat consumption. In this case, the total heat consumption for n_e effective driers is approximately

$$Q_E = Qn_e = n_e(t_a - t_o)[k_o'A_U + VW(Y_a + W_1S_1)] \quad \text{.....[14]}$$

The heat input to the preheating driers may be approximated by considering only the heat used in raising the paper temperature from T_1 to t_o, and neglecting radiation to the air. In this case the total heat input to the preheater drums is

$$Q_p = (t_o - T_1)(Y_1 + W_1S_1)VW \quad \text{[15]}$$

The efficiency of the complete drier bank is

$$\eta = \frac{\text{heat used in evaporating water}}{\text{total heat input}} = \frac{Wd_o}{Q_E + Q_p} \quad \text{.....[16]}$$

2. Practical Application of the Drying Formulas

In the manufacture of newsprint, the fixed charge is today the largest single cost. Modern newsprint machines operate at speeds ranging from 900 to 1400 fpm but greater speeds will doubtless be realized in the future. By reason of the uniformity of the product, the conditions of operation can be fixed, thus permitting the machine designer to set definite limits to the drying problem. The paper machine itself is the costliest piece of equipment in the mill. The authors' experience has been largely with

TABLE II.—ACTUAL NUMBER OF DRIERS IN VARIOUS MACHINES COMPARED WITH THE NUMBER OF DRIERS CALCULATED BY AUTHORS' FORMULAS

Mill No.	Drier diam., in.	Speed, fpm	Actual no. of driers	Theoretical no. of driers[a] n_e	n_p	n
1	60	1120	44	37.8	2	41
2	60	1280	50	41.7	2	45
3	60	900	36	32.7	2	36
4	60	800	26	30.6	2	34
5	60	1170	46	39.2	2	43
6	60	1040	40	36.1	2	40
7	60	1040	46	36.1	2	40
8	60	1200	46	39.5	2	43
9	60	1000	40	35.1	2	39
10	60	1100	44	37.4	2	41
11	60	750	32	29.7	2	33
12	60	850	36	31.0	2	34
13	60	750	28	29.6	2	33
14	60	1050	40	35.9	2	39
15	60	1050	45	35.9	2	39
16	60	1000	48	35.1	2	39
17	60	750	32	31.9	2	35
18	60	700	32	27.7	2	31
19	60	750	32	31.9	2	35
20	60	935	32	33.25	2	37
21	60	800	40	31.0	2	34
22	60	630	36	25.9	2	29
23	60	800	36	31.0	2	34
24	60	1100	44	37.4	2	41
25	60	650	32	26.6	2	30
26	60	1000	42	35.1	2	39
27	48	675	32	28.0	2	31
28	48	600	30	25.9	2	29
29	48	650	32	27.3	2	31
30	48	775	32	31.0	2	34
31	48	600	32	25.9	2	29
32	48	600	28	25.9	2	29
33	48	630	28	26.7	2	30
34	48	725	40	29.7	2	33
35	48	640	30	27.25	2	31
36	48	745	40	30.5	2	34
37	48	580	28	25.3	2	29
38	48	825	32	32.1	2	36
39	48	725	32	29.3	2	33

[a] $n = n_e + n_p + 1$ sweat drier.

Note: Operating conditions of all machines: Steam temperature in effective driers, $t_1 = 240$ F; initial consistency of paper = 28 per cent, final consistency of paper = 92 per cent; weight of paper = 32 lb. per 3,000 sq. ft. of air-dry paper (newsprint).

newsprint; hence, the following calculations and data are solely for a sheet consisting of about 10 to 20 per cent chemical pulp and remainder ground wood pulp. The weight of the sheet (32 lb) is expressed as the weight of 3000 sq ft or air-dry paper. The finished sheet is about 0.003 in. thick. In order to dry out wet streaks, the tendency is to overdry the paper and then permit the dried sheet to regain moisture by passing over a shell known as the "sweat drier" through which cold water is circulated. This fact is ignored in the following charts.

Fig. 4 illustrates theoretical drier performance. Loose felts, poor drainage of condensate can, and do, alter the actual performance of each drier. From Equation [9], the number of driers was first calculated. Referring to Fig. 4, ordinates from the number of the drier to each curve represent the average conditions on that drier. The surface temperature curve t_a is calculated from Equations [3] and [4]. The heat-unit curve Q shows the heat transmitted by each drum, calculated from Equation [13].

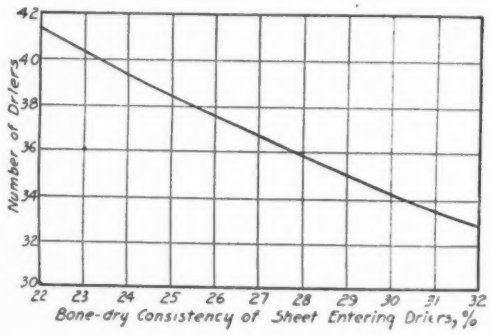

Fig. 7. Influence of Paper Wetness on the Theoretical Number of Driers.

(Speed = 1200 f.p.m.; drum diameter = 60 in.; final consistency = 92 per cent; and weight of paper = 32 lb. per 3000 sq. ft. of air-dry paper.)

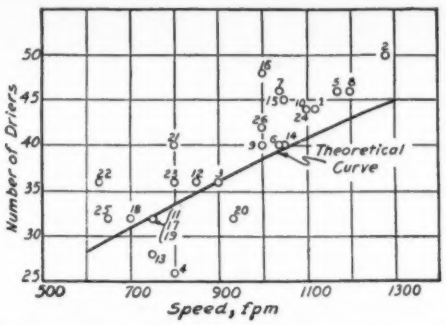

FIG. 8. ACTUAL NUMBER OF DRIERS ON REPRESENTATIVE MACHINES COMPARED WITH THEORETICAL NUMBER OF DRIERS COMPUTED AT AUTHORS' EQUATIONS.

(Theoretical curve based on the following conditions: Diameter of driers = 60 in.; steam pressure in drums = 10 lb. per sq. in. gage; initial consistency of paper = 28 per cent; final consistency of paper = 92 per cent; number of preheating driers = 2; number of effective driers = n_e; total number of driers = $n_p + n_e + 1$ sweat drier; weight of paper = 32 lb. per 3000 sq. ft. of air-dry paper.)

The water evaporated on each drum is given by curve e, calculated from Equation [6]. The consistency curve C indicates the mean percentage by weight of bone-dry fiber in the sheet on each drier. For specific design, this curve can be assumed, and the steam supply and drainage system designed to give the required shell surface temperatures which will conform with the assumed curve. Fig. 7 shows a curve the abscissas of which represent increasing increments of wetness of sheet entering the driers; the ordinates are the number of drier cylinders required.

Table 2 gives the drier diameter, operating speed, theoretical and actual number of driers, for a number of representative newsprint machines operating under the following conditions: An average steam temperature of 240 deg. F, a newsprint of 32 lb basis weight, initial bone-dry consistency of 28 per cent, and final consistency of 92 per cent. These data are used in calculating the values given in the column for n_e. The actual and theoretical number of driers have been plotted in Fig. 8 with the known operating speeds as a base. It will be noted that above 1000 fpm the actual number of driers are all above the line, indicating that the drying capacity is excessive or that the speeds for which the machines were designed have not been attained. The slow-speed machines on the other hand appear to have a speed greater than the original design speed. However, in the case of machines using exhaust steam for drying, a low back pressure may account for the larger number of driers. Fig. 8 would appear to amply demonstrate the validity of the equations presented.

VACUUM DRYING

These equations may also be used for vacuum drying with the following modifications

(1) The surface coefficient, K'_o (See Equation (3) will be proportional to the power (0.7) of both air velocity and pressure. For a vacuum of 27 in. Hg, this coefficient has been calculated to be 1.14. *(8)*.

(2) The evaporation temperature will be the temp. of steam corresponding to the vacuum, not a function of speed as for atmospheric drying. For example, given a speed of 1000 fpm, a drier diameter of 60 in., a 27 in. vacuum, initial and final consistencies of 28 per cent and 92 per cent, respectively, and a newsprint sheet. Vapor will leave the sheet at a temperature of 114 F. Assume a steam temperature of 240 F. By calculation, t_a = 216 F. Substituting for known values in Equation [9], the number of driers is equal to 18 plus 1 preheating drier. An actual installation has twenty-two 60-in. driers. By calculation steam required per ton of Air Dried Paper = 5100 pds. F. & A. However if heat recovery is taken into consideration, the apparent steam economy resulting from vacuum drying cancels out.

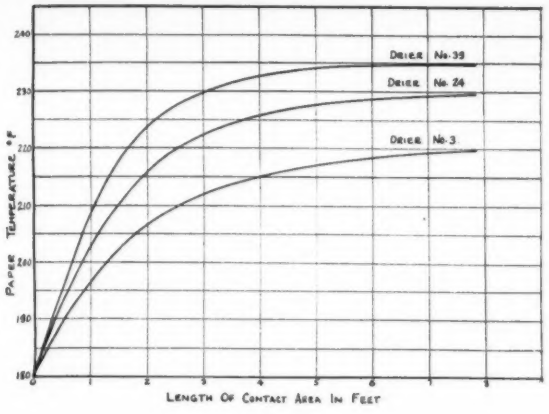

FIG. 9.

It is probable that there is some relation between the drum diameter and the speed, other things being equal. Equation [5] can be used to plot the temperature gradient of the wet sheet on a given drier. See Fig. 9. It is conceivable that with a large drier at slow speed the incremental gain of heat by the wet sheet toward the end of the contact cycle may fall so rapidly that the last 2 or 3 ft of contact length are practically sterile. Perhaps a greater drying capacity per unit area may be realized by combining a number of large and small driers. In actual practice, however, the design of the drying system should be correlated with the heat recovery from the air used to carry away the moisture as well as the design of the hood over the drier section.

A similar analysis has been made for pulp-drying machines and the calculated data obtained agree in a gratifying manner with known operating conditions. It is hoped that this theoretical outline may serve as a stimulus and perhaps as a guide to those who have at their disposal adequate facilities for experimental work.

Literature Cited

(1) Kents, Mechanical Engineering Handbook, p. 608 (by calculation).
(2) Ibid, p. 602.
(3) Ibid, p. 634 and Am. Soc. Heating and Vent. Eng. Handbook, p. 22.
(4) Ibid, p. 592.
(5) Ibid, p. 602.
(6) Ibid, p. 630.
(7) Marks, Mechanical Engineers Handbook, p. 1448.
(8) Calculation of Heat Transmission, Fishenden and Saunders, p. 152. London, H. M. Stationery Office.

TAPPI and the Inter-Society Color Council*

As a member-body of the Inter-Society Color Council TAPPI has participated among several activities of the Council during 1936. Membership in the Council is not only limited to accredited delegates of national societies and associations but is also held by corporations, firms, and individuals. The aims of the Inter-Society Color Council are "to stimulate and coordinate the work being

* Presented at the Annual Meeting of the Technical Association of the Pulp and Paper Industry, Waldorf-Astoria Hotel, New York, N. Y., Feb. 22-25, 1937.

done by various societies and associations leading to the standardization, description and specification of color, and to promote the practical application of these results to the color problems arising in science, art, and industry". The Council is in no way a standardizing body or research group but instead is an organization to bring together individuals having a common interest in color and to disseminate information through news letters and reports.

During 1936 four News Letters, totalling 93 pages, were issued to the members through the office of the Council's secretary, R. G. Macdonald. This publication is very informative and contains items of color interest, abstracts of many papers on the subject of color, notices of meetings on color and various notations concerning color specifications and standards.

The annual meeting of the Council was held on February 20, 1936 at the Waldorf-Astoria Hotel in New York City. TAPPI was represented at this meeting by four of its delegates: M. N. Davis, L. C. Lewis, R. G. Macdonald and J. L. Parsons. The officers of the Council, elected by mail ballot, are as follows: M. Rea Paul, chairman; D. B. Judd, vice-chairman; R. G. Macdonald, secretary; Mrs. M. H. Rorke, treasurer; and as counsellors, W. F. Little, F. L. Dimmick, and W. M. Scott. At the conclusion of the business meeting, lectures were given on (1) the chemistry of color, (2) color as light, and (3) color in use. About 500 attended these lectures which were given by representatives of the International Printing Ink Corporation.

A conference on Color was held at the Massachusetts Institute of Technology, July 1936, and members of the Council were requested to present papers dealing with the following subjects: Color problems in the textile industry; the inter-relationship of the various aspects of color; colorimetry in the dyestuffs industry, with special reference to fastness testing; computations involving the standard observer; specification of whiteness; the solution of grading problems by the use of a disk colorimeter; artificial daylight and its applications in colorimetry; the Munsell system of color specification; the accuracy of spectrophotometric measurements; specification of the colors of railway signal glasses; the standard observer in colorimetry; color tolerances in terms of material standards; the specification of the whiteness of paper; the optics of pigmented films; the industrial significance of color measurements; and, tolerance in color specifications.

At the M.I.T. Conference on Color, L. C. Lewis, vice chairman of the TAPPI Color Committee, presented the paper "Recent Progress on Color Problems in the Paper Industry".

The Council's Committee on Problems has found it necessary to set up various sub-committees to handle the different matters that are brought to its attention. Those projects holding general interest are as follows:

Project No. 5—Compilation of "Who's Who in Color."

Project No. 6—Survey of color terms that have been officially adopted by technical societies and associations, or which, through general use, have become well recognized in industry.

Project No. 7—Survey of color specifications that have been adopted by technical societies and associations, or which are in commercial use.

Project No. 8—Survey of color problems that are of broad interest and have been brought before national societies and associations for consideration.

One of the original projects referred to the Council by the National Formulary Committee of the American Pharmaceutical Association requested a new system for naming the colors used in the United States Pharmacopoeia. Such a question of color nomenclature is complicated by the fact that there are 100,000,000 distinguishable colors, of which some 10,000,000 are producible by dyes and pigments, and for which, in the present U.S.P. system, there are only some 500 color names. Each name, therefore, referred to a range of color rather than to a single color. After consideration, the Council's Committee on Measurement and Specification developed a new system of color naming, for use by the U.S.P., that will provide a definite, accurate measure of color strength and tone. The new color names are simple, easily understood, and usable, and are based on a logical scientific system which gives them a legal standing, making them available for many types of analytical work. The system is based on the use of such terms as red, green, blue and purple, with the component hues: orange, pink, brown and olive. The modifiers are faint, pale, light, brilliant, weak, vivid, strong, dusky, dark and deep, together with the adverb "very". The resulting terms, such as "very dark blue", would relate to a definite standard of color, rather than to the color education of an individual observer as has been the case. Indefinite names ending in "ish", such as reddish, yellowish, etc., have been eliminated, except as modifiers of definite names, such as reddish purple, yellowish green, etc.

The fundamental method of applying the new system of color names, consists of measuring the spectral reflectance of the substance under study, computing the tri-stimulus specification of it, and deriving the color name from these data. In actual usage, however, reference standards such as the Munsell Book of Color may be used for visual comparison, which, with practice, takes only from one to five minutes. Standardizing laboratories may apply the more fundamental method in cases of dispute or legal demands.

In order to put this new system into effect, research is being conducted at the National Bureau of Standards, under the direction of D. B. Judd of the Bureau's staff, who is Vice-Chairman of the Council, and by K. L. Kelly, research associate, under a National Formulary research project of the American Pharmaceutical Association which is sponsoring the work as a means of standardizing the color names used to describe official drugs and pharmaceuticals used in the treatment of disease. Many changes in official standards for drugs have already been recommended as a result of the research to date.

In general, the Council does not initiate its own problems, nor endeavor in all instances to provide their solution, but instead, seeks to bring together the individual or technical group having the problem, with some person qualified to provide its solution.

Several delegates representing TAPPI have been active in the affairs of the Council during the past year: R. G. Macdonald is the Council's secretary; L. C. Lewis is in charge of a Sub-Committee on Color Tests, Color Terms and Color Problems; and J. L. Parsons is assisting in the compilation of a "Who's Who in Color". The TAPPI Inter-Society Color Council delegates include the members of the Color Committee plus the secretary of the Association.

The Sixth Annual Business Meeting of the Inter-Society Color Council was held at 2:00 P.M. on February 25, 1937, in the Waldorf-Astoria Hotel, New York City. There was also an evening meeting at 7:30 o'clock in the Auditorium of the N. Y. Electrical Association, Grand Central Palace, New York City. Deane B. Judd of the National Bureau of Standards presented a paper on "The Specification of Chromatic Filters for Stage Illumination", and Jonel Jorgelesco talked on "How the Stage Designer Uses Lights".

JOHN L. PARSONS.

Transportation of TAPPI Convention

Following are the time and fare schedules of the principal steamship and railroad lines to Savannah, Ga., serving the fall convention of the Technical Association of the Pulp and Paper Industry, October 18-21, 1937. No line has been designated as official.

Atlantic Coast Line

A special train is being arranged leaving Boston 8:30 P. M., Saturday, October 16; New York, Sunday, 2:25 P. M.; Washington, 6:50 P. M. and arriving at Savannah at 7:30 A. M., Monday, October 18th. Pittsburgh trains connect with this train at Washington. There is also daily service from these points arriving in Savannah at noon.

One way fare is $25.35 and round-trip fare is $38.15 (lower berth $6) New York to Savannah.

Seaboard Air Line

A special train will leave New York at 1:30 P. M., Sunday October 17; 3:15 P. M. from Philadelphia; 5:35 P. M. from Washington, arriving at Savannah at 8:00 A. M., Monday, October 18. Connecting train service is from Pittsburgh at 8:40 and from Montreal at 9:30 P. M. The fare are the same as those indicated for the Atlantic Coast Line.

Louisville and Nashville

Passengers may leave Chicago at 11:40 P. M.; Cleveland at 10:00 P. M.; Detroit at 12:15 A. M.; Cincinnati at 8:00 A. M. and St. Louis at 10:50 P. M., arriving in Atlanta at 6:35 P. M. Leave Atlanta at 10:00 P. M. and arrive at Savannah at 8:00 A. M.

The fares from these cities to Savannah are as follows: Chicago $30.50 one way and $40.99 round trip (lower berth $7.25); St. Louis $27.25 one way and $36.20 round trip, (lower berth $6); Cleveland $29.65 one way and $43.65 round trip (lower berth $7.25); Detroit $29.85 one way and $44.40 round trip (lower berth $7.25); and Cincinnati $22.05 one way and $29.35 round trip.

NOTE: (If enough passengers warrant it, through cars to Savannah from any of the above mentioned points will be provided).

Merchants and Miners Transportation Co.

The S. S. Allegheny will sail from Baltimore at 6:00 P. M., Friday, October 15 and will arrive in Savannah at 7:00 A. M. on Monday, October 18.

The passenger fares are $20 one way and $30 round trip (18 day limit). Automobile rates are $22.50 one way and $37.50 round trip when accompanied by one passenger. When accompanied by two or more passengers it is $17.50 one way and $27.50 round trip.

Ocean Steamship Co. (Savannah Line)

The S. S. City of Chattanooga leaves Boston at 3:00 P. M., October 9, New York 5:00 P. M., October 10, and is due at Savannah 6:00 A. M., October 14.

The fare from Boston to Savannah is $33 one way or $55 round trip. From New York it is $27 one way and $47 round trip, including meals and stateroom.

Clyde Mallory Line

The S. S. Seminole sails from Pier 34, North River, New York at noon, Thursday, October 14, arrives Charleston, S. C. 7:00 A. M., Saturday, October 16 and Jacksonville on Sunday at 7:00 A. M.

The S. S. Shawnee sails from New York at noon Saturday, October 16, arrives Jacksonville 8:00 A. M., Monday, October 18.

Trains leave Charleston 2:46 P. M. and 5:00 P. M., arriving in Savannah 5:10 P. M. and 8:00 P. M.

Trains leave Jacksonville 8:15 A. M.; 9:00 A. M.; and 10:30 A. M. and arrive in Savannah 11:37 A. M.; 12:01 P. M., and 2:05 P. M.

Round trip fare New York to Charleston $40 and to Jacksonville $50 including stateroom and meals.

Railroad fare Jacksonville to Savannah $5.15 and from Charleston to Savannah $3.85.

Round trip rates for automobiles New York to Charleston is $35 and to Jacksonville it is $45.

TAPPI Golf at Savannah

The Savannah Golf Club has extended the privileges of their club to members and guests during the fall convention of the Technical Association of the Pulp and Paper Industry at Savannah, Ga., October 18-21. The green fee will be $1.00 per round. The Union Bag and Paper Corporation also extends golfing privileges to those attending the Convention. The 9 hole Union Bag course adjacent to the mill will be open to those who wish to play, without green fees.

P. F. McMahon of the Union Bag and Paper Corporation has arranged several tournaments at the Savannah Golf Club. The Savannah Golf Club is said to be the oldest club in the United States. The bunkers are breastworks erected by the Confederate forces during the War Between the States. Bobby Jones holds the course record of 65.

The tournaments can be played either Monday or Tuesday afternoon. Prizes are as follows:

PRIZES

Boondoggle:
- First Prize — Members Only — 1 Set Matched Woods.
- First Prize—Guests Only—1 Set Matched Woods.

Second Prize—Members and Guests—Golf Bag.
Low Net: Members and Guests—Liquor Case.
Low Gross: Members and Guests—Aeroplane Bag.
Blind Bogie:
- First Prize—Members Only—Gladstone Bag.
- First Prize—Guests Only—Cigarette Case.
- Second Prize — Members and Guests — Carryall Bag.
- Third Prize—Members and Guests—Umbrella.

Other prizes will be announced later. Golf prizes have been donated by the following firms:

Pusey Jones Corporation
J. W. Bolton & Sons.
Merritt Chapman & Scott. Corporation.

Allis-Chalmers to Pay $1.00

Allis-Chalmers declared a dividend of $1 on the common, payable September 30, to stock of record September 13. Dividends of 50 cents each were paid on June 30 and March 31.

New TAPPI Members

The Executive Committee of the Technical Association of the Pulp and Paper Industry has elected the following to membership:

Stephen Beard, Chemist, J. and J. Makin Ltd., Disley Paper Mill Branch, Disley, England, is a 1928 graduate of the Manchester College of Technology and was formerly with the Grove Mill Paper Company, New Mills, England.

George C. Borden Jr., development engineer, Riegel Paper Corporation, Milford, N. J. is a 1923 graduate of Lehigh University and was formerly with the American Cyanamid Company, Warners, N. J.

Sidney A. Brown, chemical engineer, Rogers Paper Manufacturing Company, Manchester, Conn. is a 1928 graduate of the Massachusetts Institute of Technology.

Harry L. Bullock, Premier Mill Corporation, New York, N. Y. attended Columbia University and was formerly with the Federal Bearings Company, the Celluloid Corporation and the Keratol Company.

Wilby E. Cohen, senior chemist, Division of Forest Products, Council for Scientific and Industrial Research, Victoria, Australia, is a graduate (Ph. D. 1936) University of Western Australia.

Lovell M. Cushing, Supervisor at the Port Royal Pulp and Paper Company for the Brown Company, St. Johns, N. B., is a 1921 graduate of Tufts College and has been with the Brown Company, Berlin, N. H. since 1922.

Robert E. E. Driessen, foreman, asphaltic conversion, Thilmany Pulp and Paper Company, Kaukauna, Wis., is a 1936 graduate of Purdue University.

Charles F. Dwinal, Jr. research chemist, International Paper Company, Niagara Falls, N. Y. is a 1935 graduate of the University of Maine.

Thomas G. Finch, industrial engineer, Alliance Paper Mills Ltd., Merritton, Ont. is a 1912 graduate of the Mining and Technical College, Wigan, England.

Andrew I. Fleming, works manager, Westfield Paper Company, Bathgate, Scotland, is a 1935 graduate of Heriot Watt College, Edinburgh, and was formerly with H. Bruce & Sons, Ltd., Kinleith Paper Mills, Midlothian, Scotland.

LaVern A. Gilbertson, technical staff, Marathon Paper Mills Company, Menasha, Wis. is a 1934 graduate of the Institute of Paper Chemistry and was formerly with the Forest Products Laboratory, Madison, Wis., Dill & Collins, Inc., Philadelphia, Pa. and the Western Electric Company, Kearney, N. J.

Claude S. Goyder, sales, International Paper Company, New York, N. Y., is a 1934 graduate of Cambridge University, England.

Robert E. Harper, sulphite chemist, Rhinelander Paper Company, Rhinelander, Wis., is a 1936 graduate of the University of Nebraska.

Lewis G. S. Hebbs, Partner, Cross and Bevan, London, England, is a 1935 graduate of Polytechnic, London, England.

Willian A. Kelley, Milwaukee, representative, E. D. Jones & Sons Company, Pittsfield, Mass. is a 1925 graduate of Pennsylvania State College and was formerly with the General Electric Company and the Reliance Electric and Manufacturing Company, Cleveland, Ohio.

Frank X. Kreiling, Jr., chemist, Thilmany Pulp and Paper Company, Kaukauna, Wis. is a 1932 graduate of Lawrence College and was formerly a technical assistant at the Institute of Paper Chemistry, Appleton, Wis.

John A. Niemczyk, technical director, W. F. Hall Printing Company, Chicago, Ill., is a 1930 graduate of the Lewis Institute and was formerly with the Miner Laboratories and the Barrett Company.

James Petrie, technical supervisor, Pacific Mills, Ltd., Ocean Falls, B. C. attended Victoria College and was formerly with the Victoria Chemical Company, Victoria, B. C. and Canadian Explosives Ltd., James Island, B. C.

Walter Placzankis, beater engineer, Great Northern Paper Company, Madison, Maine, is a 1930 graduate of Bowdoin College and was formerly chemist with Fraser Paper Ltd., Madawaska, Maine and the International Paper Company, Rumford, Maine.

Rudolph C. Richter, chemist, Union Bag and Paper Company, Savannah, Ga. is a 1930 graduate of the University of Georgia and was formerly with the Pulp and Paper Laboratory of the Industrial Committee of Savannah, Ga.

Philip M. Shuey, president and general manager, Shuey & Company, Savannah, Ga. is a 1905 graduate of the Virginia Polytechnic Institute and was formerly with the Savannah Guano Company and the Mutual Mining Company, Newbury, Fla.

John R. Stephenson, chemist, American Coating Mills, Elkhart, Ind., is a graduate of the University of Kansas and McGill University, and was formerly with the American Oil Products Company, Logansport, Ind. and the Elkhart Water Company.

Edmund B. Taylor, chief chemist, Harding-Jones Paper Company, S. Excello, Ohio, is a 1936 graduate of Princeton University and was formerly with the Pennsylvania Salt Manufacturing Company, Philadelphia, Pa., the Tubize Rayon Company, Hopewell, Va. and was the Dupont Research Fellow at the Institute of Paper Chemistry, Appleton, Wis.

Cecil L. Triplett, chemical assistant, Hawley Pulp and Paper Company, Oregon City, Ore. is a 1936 graduate of the Oregon State College.

J. P. Venturini, salesman, Cameron Machine Company, Brooklyn, N. Y. was formerly with the Dexter Folder Company.

Bulkley, Dunton Joins TAPPI

Bulkley, Dunton & Co., New York, N. Y. has become a member of the Technical Association of the Pulp and Paper Industry. This company which is well known in the paper and graphic arts industry as a distributor of pulp and paper is also the owner of the American rights to the Bewoid sizing process which is licensed under the American Bewoid Company. P. M. Loddengaard will represent the company in the Technical Association.

Geo. A. Whiting Installs Boiler

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., September 7, 1937—Installation of a new boiler has been completed at the George A. Whiting Paper Company, Menasha, Wis. It will be placed in operation within about a week, following tryouts and inspection. The approximate expenditure for the improvement was $10,000.

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All kinds and styles of Felts for all kinds and styles of Papers.

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Giving Manifests of New York, Boston, Philadelphia and Other Ports, of Newsprint, Wrapping, Writing, Coated, Blotting, Tissue, Strawboard, Wallboard, Cigarette Papers, Sulphite, Kraft and Ground Wood Pulp.

New York Imports

WEEK ENDING SEPTEMBER 4, 1937
SUMMARY

Cigarette paper	376 cs.
Wall paper	2 crates, 2 bls., 21 cs.
Paper hangings	6 bls., 1 cs.
Newsprint	9,896 rolls
Printing paper	31 rolls, 43 cs.
Wrapping paper	4,585 rolls, 44 bls., 12 cs.
Packing paper	25 cs.
Drawing paper	48 cs.
Filter paper	16 cs.
Filter mass	100 bls.
Filter compound	75 bls.
Tracing cloth	12 cs.
Surface coated paper	96 cs.
Basic paper	45 cs.
Decalcomania paper	5 drums (duplex) 4 cs.
Decalcomanias	34 cs.
Transfer pictures	7 cs.
Tissue paper	11 drums, 8 cs.
Writing paper	6 cs.
Envelopes	2 cs.
Colored paper	5 cs.
Card board	89 cs.
Gummed paper	6 cs.
Paper tubes	124 pkgs.
Miscellaneous paper	93 bls., 18 cs.

CIGARETTE PAPER

De Mauduit Paper Corp., *Pr. Roosevelt,* Havre, 175 cs.
Champagne Paper Corp., *Pr. Roosevelt,* Havre, 200 cs.
P. J. Schweitzer, *Exeter,* Marseilles, 1 cs.

WALL PAPER

F. J. Emmerich, *Duetschland,* Hamburg, 1 cs., 1 ble., 1 crate.
———, *Manhattan,* Havre, 17 cs.
———, *Bremen,* Bremen, 2 cs., 1 ble.
Heemsoth Kerner Corp., *Bremen,* Bremen, 1 cs.

PAPER HANGINGS

W. H. S. Lloyd & Co., *American Banker,* London, 6 bls., 1 cs.

NEWSPRINT

H. G. Craig Co., Inc., *Kermic,* Donnacona, 303 rolls.
International Paper Co., *International No. 1,* Gatineau, 309 rolls.
International Paper Co., *G. T. D.,* Gatineau, 303 rolls.
Jay Madden Corp., *Pr. Roosevelt,* Hamburg, 357 rolls.
N. Y. Evening Journal, *Markland,* Liverpool, N. S., 488 rolls.
N. Y. Tribune, *Markland,* Liverpool, N. S. 1644 rolls.
World Telegram, *Markland,* Liverpool, N. S., 548 rolls.
Brooklyn Daily Eagle, *Markland,* Liverpool, N. S., 548 rolls.
Westchester Newspapers, Inc., *Markland,* Liverpool, N. S., 47 rolls.
South Norwalk Sentinel, *Markland,* Liverpool, N. S., 52 rolls.
Perkins Goodwin & Co., *St. Louis,* Hamburg, 479 rolls.
Jay Madden Corp., *St. Louis,* Hamburg, 365 rolls.
Jay Madden Corp., *St. Louis,* Bremen, 167 rolls.
Jay Madden Corp., *Columbus,* Bremen, 134 rolls.
International Paper Co., *Dalmore,* Dalhousie, 3132 rolls.
International Paper Sales Co., *Dalmore,* Dalhousie, 980 rolls.

PRINTING PAPER

Japan Paper Co., *Pr. Roosevelt,* Havre, 8 cs.
Steiner Paper Corp., *St. Louis,* Bremen, 10 cs.
Keuffel & Esser Co., *Manhattan,* Hamburg, 31 rolls.
L. A. Consmiller, *Bremen,* Bremen, 25 cs.

WRAPPING PAPER

Jay Madden Corp., *Pr. Roosevelt,* Hamburg, 709 rolls.
———, *Georgic,* London, 20 rolls.
Keller Dorian Paper Co., *Exeter,* Marseilles, 12 cs.
Jay Madden Corp., *Manhattan,* Hamburg, 3856 rolls, 44 bls.

PACKING PAPER

Phoenix Shipping Co., *Columbus,* Bremen, 25 cs.

DRAWING PAPER

H. Reeve Angel & Co., Inc., *Georgic,* London, 6 cs.
Keuffel & Esser Co., *Manhattan,* Hamburg, 42 cs.

FILTER PAPER

H. Reeve Angel & Co., Inc., *Georgic,* London, 15 cs.
———, *Deutschland,* Hamburg, 1 cs.

FILTER MASS

A. W. Fenton Co., Inc., *Columbus,* Bremen, 100 bls.

FILTER COMPOUND

Mager Bros. Co., *Deutschland,* Hamburg, 75 bls.

TRACING CLOTH

E. Dietzgen & Co., *Samaria,* Liverpool, 12 cs.

SURFACE COATED PAPER

Gevaert Co. of America, *Pennland,* Antwerp, 33 cs.
Gevaert Co. of America, *Black Gull,* Antwerp, 49 cs.
L. A. Consmiller, *St. Louis,* Bremen, 13 cs.
Phoenix Shipping Co., *Deutschland,* Hamburg, 1 cs.

BASIC PAPER

Dingelstedt & Co., *Pennland,* Antwerp, 8 cs.
Dingelstedt & Co., *St. Louis,* Hamburg, 15 cs.
Dingelstedt & Co., *Columbus,* Bremen, 22 cs.

DECALCOMANIA PAPER

B. F. Drakenfeld & Co., *Samaria,* Liverpool, 4 cs., 5 drums, (duplex).

DECALCOMANIAS

Sellers Transportation Co., *Columbus,* Bremen, 23 cs.
Sellers Transportation Co., *Bremen,* Bremen, 11 cs.

TRANSFER PICTURES

Rohner Gehrig & Co., *Columbus,* Bremen, 7 cs.

TISSUE PAPER

B. F. Drakenfeld & Co., *Samaria,* Liverpool, 11 drums.
Globe Shipping Co., *Columbus,* Bremen, 8 cs.

WRITING PAPER

Globe Shipping Co., *Manhattan,* Hamburg, 6 cs.

ENVELOPES

H. W. Robinson & Co., *Pr. Roosevelt,* Hamburg, 2 cs.
H. W. Robinson & Co., *Manhattan,* Hamburg, 24 cs.

COLORED PAPER

International F'd'g Co., Deutschland, Hamburg, 5 cs.

CARD BOARD

Metropolitan Importing & Manfg. Co., *Manhattan,* Hamburg, 19 cs.
———, *E. Francqui,* Antwerp, 43 cs.
———, *St. Louis,* Hamburg, 27 cs.

GUMMED PAPER

Heemsoth Kerner Corp., *Bremen,* Bremen, 6 cs.

PAPER TUBES

———, *Columbus,* Bremen, 124 pkgs.

MISCELLANEOUS PAPER

Horman Schutte Co., *Exeter,* Genoa, 10 cs.
———, *American Banker,* London, 1 cs., 2 trusses.
T. N. Fairbanks Co., *Rex,* Genoa, 7 cs.
———, *Deutschland,* Hamburg, 93 bls.

RAGS, BAGGINGS, ETC.

Banco Coml Italiane Trust Co., *Tokai Maru,* Yokohama, 50 bls. picker waste.
J. Cohen Sons Co., Inc., *Georgic,* London, 32 bls. rags.
———, *Capulin,* Dundee, 34 bls. paper stock.
———, *American Banker,* London, 52 bls. paper stock.
———, *American Banker,* London, 81 bls. old strings.
———, *Samaria,* Liverpool, 52 bls. rags.
W. Steck & Co., *Bayard,* London, 86 bls. waste strings.
———, *Tai Yang,* Kobe, 150 bls. cotton waste.
Chase National Bank, *Tai Yang,* Kobe, 80 bls. rope waste.
Loumar Textile By Products, Inc., *Tai Yang,* Kobe, 46 bls. rayon thread waste.
E. J. Keller Co., Inc., *Tai Yang,* ———, 111 bls. hemp waste.
Hughes Fawcett, Inc., *Cameronia,* Glasgow, 29 bls. flax waste.
Van Oppen Co., *E. Francqui,* Antwerp, 84 bls. paper stock.
American Express Co., *Black Gull,* Rotterdam, 104 bls. rags.
Hughes Fawcett, Inc., *Black Gull,* Antwerp, 4 bls. flax waste.
E. Butterworth & Co., Inc., *Black Gull,* Antwerp, 75 bls. bagging.
E. J. Keller Co., Inc., *Black Gull,* ———, 151 bls. bagging.
Chase National Bank, *Nordkap,* Buenos Ayres, 242 bls. rags.

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Send for free working sample for test. State size of packing used.

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Mechanicsville, New York
Luke, Maryland
Covington, Virginia
Tyrone, Pennsylvania
Williamsburg, Pennsylvania
Cass, West Virginia

Castle & Overton, Inc., *Exeter,* Alexandria, 522 bls. rags.
——, *Exeter,* Alexandria, 304 bls. rags, 162 bls. bagging.
W. Steck & Co., *Exeter,* Alexandria, 70 bls. rags, 147 bls. bagging, 81 bls. tares.
Hicks Costarino Co., Inc., *Exeter,* Alexandria, 341 bls. rags.
R. J. Ross Co., Inc., *Exeter,* Alexandria, 176 bls. bagging.
E. J. Keller Co., Inc., *Exeter,* ——, 373 bls. rags, 148 bls. bagging.
Keene, Inc., *Exeter,* Piraeus, 46 bls. rags, 52 bls. bagging.
J. T. Flannery, *Vincent,* Havre, 32 bls. rags.
R. Blank, *Vincent,* Havre, 81 bls. rags.
Chase National Bank, *Vorshilov,* Leningrad, 782 bls. flax waste, 1174 bls. rags.
Banco Coml Italiane Trust Co., *Vorshilov,* Leningrad, 159 bls. rags.
Banco Coml Italiane Trust Co., *Deutschland,* Hamburg, 247 bls. rags.
E. J. Keller Co., Inc., *Manhattan,* ——, 112 bls. jute waste.
Irving Trust Co., *Beemsterdyk,* Rotterdam, 37 bls. old linens.

BONE GLUE

——, *Deutschland,* Hamburg, 200 bags.

OLD ROPE

Manufacturers Trust Co., *American Banker,* London, 78 coils.
E. J. Keller Co., Inc., *Cavallo,* ——, 87 coils.
Irving Trust Co., *E. Francqui,* Antwerp, 121 bls.
W. Steck & Co., *Black Gull,* Rotterdam, 80 coils.
G. W. Millar & Co., Inc., *Beemsterdyk,* Rotterdam, 44 coils.
——, *Beemsterdyk,* Rotterdam, 30 coils.

CASEIN

American British Chemical Supplies, *Western Prince,* Buenos Ayres, 417 bags.

CHINA CLAY

E. Fougera & Co., *Georgic,* London, 50 casks.
Whitaker Clark & Daniels, *Samaria,* Liverpool, 260 bags.

WOOD PULP

Bank of N. Y. Trust Co., *St. Louis,* Hamburg, 2680 bls. wood pulp, 536 tons.
Castle & Overton, Inc., *Deutschland,* Hamburg, 2025 bls. wood pulp, 405 tons.

WOOD PULP BOARDS

Jay Madden Corp., *Pr. Roosevelt,* Hamburg, 94 bls.

WOOD PULP PASTE BOARDS

Flexideal Dry Mat Co., *Manhattan,* Hamburg, 71 cases.

NEWARK IMPORTS

WEEK ENDING SEPTEMBER 4, 1937

H. G. Craig Co., Inc., *Newscarrier,* Donnacona, 316 rolls newsprint.
H. G. Craig Co., Inc., *G.D.D.,* Donnacona, 324 rolls newsprint.
H. G. Craig Co., Inc., *Donpaco,* Donnacona, 315 rolls newsprint.

BOSTON IMPORTS

WEEK ENDING SEPTEMBER 4, 1937

International Purchasing Co., *Black Gull,* Rotterdam, 81 coils old rope.
——, *Black Gull,* Rotterdam, 106 bls. wood pulp boards, 27 tons.
——, *Black Gull,* Rotterdam, 60 rolls straw boards.
New England Waste Co., *Black Gull,* Antwerp, 1 ble. wrapping paper.
Train Smith Co., *Black Gull,* Antwerp, 96 bls. bagging.
——, *Black Gull,* Antwerp, 6 bls. rags, 12 bls. thread waste, 148 bls. rayon waste.
American Express Co., *Black Gull,* Antwerp, 261 bls. wrapping paper.
International Purchasing Co., *Black Gull,* Antwerp, 60 coils old rope.
Parsons & Whittemore, Inc., *Capulin,* ——, 726 bls. wood pulp.
Parsons & Whittemore, Inc., *Wasgenwald,* ——, 1100 bls. wood pulp.

PHILADELPHIA IMPORTS

WEEK ENDING SEPTEMBER 4, 1937

Castle & Overton, Inc., *Capulin,* Hamburg, 1656 bls. wood pulp, 331 tons.
J. H. Weill Co., *Bayard,* London, 1 cs. drawing paper.
Castle & Overton, Inc., *Vincent,* Havre, 520 bls. rags.
J. T. Flannery, *Vincent,* Havre, 42 bls. rags.
Strawbridge & Clothier, *Vincent,* Havre, 3 cs. writing paper.
E. J. Keller Co., Inc., *Vincent,* ——, 53 bls. rags.
Continental Bank Trust Co., *Vincent,* Dunkirk, 51 bls. rags.

BALTIMORE IMPORTS

WEEK ENDING SEPTEMBER 4, 1937

Parsons & Whittemore, Inc., *City of Havre,* ——, 580 bls. wood pulp.
Gottesman & Co., Inc., *Roxen,* Sweden, 1200 bls. sulphite, 1200 bls. sulphate.

NEW ORLEANS IMPORTS

WEEK ENDING SEPTEMBER 4, 1937

Gottesman & Co., Inc., Taurus, Sweden, 4200 bls. sulphate.

Want Paper Bids Investigated

Governor Stark of Missouri, acting at the request of fourteen paper jobbers, has asked the Attorney General to investigate the circumstances of the annual contract for about $250,000 of paper awarded to the Graham Paper Company of St. Louis, June 8, the sole bidder.

The paper merchants ask that the contract be re-let. Secretary of State Brown stated that the Commissioners of Public Printing had let all paper contracts according to law and if any dissatisfaction exists, they have the right to go to the courts. Martin J. Collins, president of the Graham Paper Company, has refused to discuss the complaint of the competing companies.

L. W. Lawrence Visits Pacific Coast

L. W. Lawrence is now on his annual trip to the west coast calling on the paper mill customers of the Schlafer Supply Company of Appleton, Wis. Mr. Lawrence has been with the company many years specializing on the company's paper mill supplies and has an enviable acquaintanceship among the paper mill men of the United States.

The Schlafer Supply Company is probably the oldest firm in the United States specializing in paper mill supplies having entered into this business 62 years ago.

Improve Port Alice and Woodfibre Mills

[FROM OUR REGULAR CORRESPONDENT]

VANCOUVER, B. C., September 4, 1937—Business of the B. C. Pulp and Paper Company with Japan has not been effected to date by the current hostilities with China, according to officials of the company. Slow progress is being made on the work now under way at Port Alice and Woodfibre in making these plants available for sulphite pulp for rayon production. The delay is due to labor troubles in the United States which has slowed up delivery of equipment. It is hoped that the changes at the Port Alice plant will be completed by the end of September, and those at Woodfibre are expected to be finished in December.

To Sign Agreements at Holyoke

[FROM OUR REGULAR CORRESPONDENT]

HOLYOKE, Mass., September 7, 1937—Agreements are expected to be signed this week between the Paper and Sulphite Workers Union and the America Tissue Mills, Inc., Marvellum Company and the Hazen Paper Company. In a general way the agreements are similar to those signed by the manufacturers of paper with Eagle lodge, the three mentioned concerns being converters.

Let us take care of your REJECTIONS, over-runs or seconds.

We have branches in fourteen different cities and can sell your rejections for you at a minimum expense to you; wherever they occur.

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Nyco Super Violet 4 R New

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CENTRIFUGAL PUMPS FOR ALL PAPER MILL PURPOSES

ASH CONVEYORS——————STOKERS

THE FREDERICK IRON & STEEL CO.

FREDERICK, MARYLAND

New York Market Review

Office of the PAPER TRADE JOURNAL,
Wednesday, September 8, 1937.

The demand for paper in the wholesale markets continued good during the week, with the volume holding up well in view of the holidays. Prices are firm, with indications of a larger volume in the immediate future. Book papers are moving freely. Bonds, ledgers and box coverings are in seasonable demand.

The newsprint market continues active. Shipments are being made in normal quantities. Reasonably satisfactory sales of wrapping paper are reported in the trade.

The box board market continues relatively quiet, with the trade reporting slightly more demand. Prices continue firm.

Chemical Pulp

The general tone of the chemical pulp market is less firm for the week. The tonnage for bleached and unbleached sulphite for new business is reported to be limited. Prices of prime bleached sulphite are slightly higher for the current week, while the quotations on strong unbleached sulphite are slightly lower. Domestic kraft pulp is reported to be plentiful at prevailing prices of about $55 per ton, delivered at buyers' mills. The prices of bleached soda pulp are slightly higher for the week.

Mechanical Pulp

No noteworthy change has taken place in the mechanical pulp market. Demand continues at about former levels and prices are unchanged from preceding quotations.

Old Rope and Bagging

The old rope market was quiet during the week The demand was light. There was no change reported in the demand for domestic or foreign business. Prices are steady at prevailing levels.

Rags

The demand for domestic rags continued steady, with prices unchanged and at the levels prevailing during the preceding week. Roofing rags were more active, with substantial increase in the prices of both No. 1 and No. 2 roofing rags.

Waste Paper

The waste paper market continued firm, with prices steady and unchanged on domestic mixed stock. The fair demand for export maintained prices at a steady level. Folded news stock remained at prevailing levels, the demand in this stock being relatively slow.

Twine

The demand for twines continued fairly active, with a moderate movement in sisal, jute and hemp. Improvement continued in the cotton twine market.

Seaboard Appoints Forester

NORFOLK, Va., September 7, 1937.—The appointment of Albert E. Wackerman as Industrial Forester of the Seaboard Air Line Railway was announced last week by Warren T. White, general industrial agent of the Seaboard. Mr. Wackerman, who will take over his duties on October 1 will make his headquarters at Norfolk, Va.

Mr. Wackerman's appointment constitutes the first, but highly significant, step in the Seaboard's newly inaugurated forestry program, which is designed to insure a continuing supply of wood for pulp mills recently located on Seaboard rails, as well as for other timber-using industries in the Southeast. The Seaboard's Industrial Department has been very active in recent years in promoting the pulp and paper industry in the South. Within the past two years eleven large pulp and paper mills have located in the six states served by the Seaboard and a site has been acquired for a twelfth. When all of these mills are in operation they will have an output in excess of 3,000 tons of pulp and paper, consuming more than 5,000 cords of pulpwood daily. Conservative estimates indicate that within the next decade more than 10,000 cords a day will be required by the pulp and paper mills in the southeastern states of Virginia, North Carolina, South Carolina, Georgia, Florida and Alabama. In addition, large demands will be made on the forests for lumber, poles, piling, cross ties and naval stores.

Kalamazoo TAPPI to Meet

The regular monthly meeting of the Kalamazoo Valley Section of the Technical Association of the Pulp and Paper Industry will start with a golf tournament and dinner on Thursday, September 16 at the Kalamazoo Country Club.

Members are invited to bring guests and the tournament will start at 3:00 P.M. Numerous prizes have been donated and a record number of players are expected to participate.

Dinner will be served at 7:30 followed by a presentation of the awards.

C. M. Baker of Madison, Wis., is to be the speaker of the evening. This talk will deal with the subject of white water utilization and stream pollution legislation.

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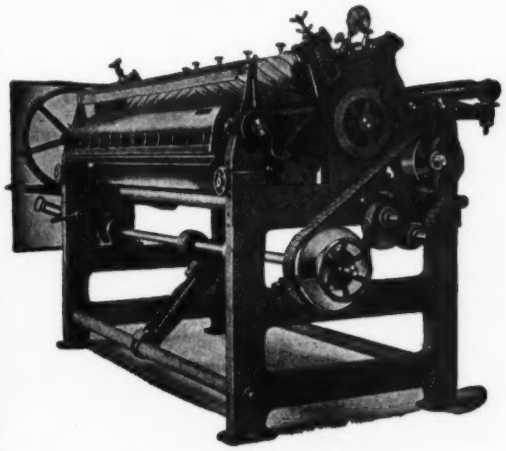

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But—consider your loss in Labor Cost and Production Delay when stubborn shafts must be reamed, filed and fitted. Add that cost to the price of the shafts and you'll see what a luxury cheap shafts really are.

Particularly, since the initial costs are so little different. A 1-15/16" dia., 20' long Cumberland Shaft, for example, is but 60 cents more than an ordinary shaft,

Count the Cost—Save the Difference! Say CUMBERLAND.

CUMBERLAND STEEL COMPANY

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Cumberland, Maryland

Miscellaneous Markets

Office of the PAPER TRADE JOURNAL,
Wednesday, September 8, 1937.

BLANC FIXE—The blanc fixe market is steady, with prices conforming to previous quotations. The prices of pulp range from $42.50 to $45 per ton, in bulk. The powder is offered at from 3½ to 3¾ cents per pound, in barrels, at works.

BLEACHING POWDER—The condition of the bleaching powder market is steady. The contract movement is normal. Prices are unchanged at prevailing levels. Bleaching powder is quoted at from $2 to $2.25 per 100 pounds, in drums, at works.

CASEIN—The casein market is firm. The demand continues steady. Domestic standard ground casein is quoted at 13½ cents per pound; domestic finely ground casein is selling at from 13½ to 14½ cents per pound, all in bags, car lot quantities.

CAUSTIC SODA—The demand for caustic soda continues steady, with the contract movement normal. Solid caustic soda is quoted at from $2.10 to $2.30, while flake and ground is selling at from $2.50 to $2.70 per 100 pounds, in drums, at works.

CHINA CLAY—The China clay market continues active, with contract shipments moving freely. Imported China clay is quoted at from $14.50 to $25 per ton, ship side. The domestic clay market is strong, with filler clay quoted at from $6.50 to $12 per ton; coating clay at from $11 to $22 per ton, at mines.

CHLORINE—Trading in the chlorine market is characterized by the trade as tight. Prices are firm under a good demand. Quotations are at prevailing levels. Chlorine is quoted at $2.15 per 100 pounds, in single-unit tank cars, f.o.b., works.

ROSIN—The rosin market continues firm, with only a slight change in prices. Paper making rosin is quoted at $7.80 and wood rosin at $8.00 per 280 pounds, gross weight, in barrels at Savannah. Seventy per cent rosin size is quoted at $3.64 per 100 pounds, in tank cars, at works.

SALT CAKE—The demand for salt cake is steady, with prices firm. Salt cake is quoted at from $12 to $13; chrome salt cake at from $10 to $11, f.o.b., shipping point. Imported salt cake is selling at $12, Gulf or Atlantic Seaboard, on dock.

SODA ASH—The condition of the soda ash market is active, with a steady demand from paper mills. Prices are unchanged at prevailing levels. Quotations in soda ash, in car lot, at works, per 100 pounds, are as follows: in bulk, $.90; in bags, $1.05; and in barrels, $1.35.

STARCH—The starch market is moderately active, with demand on a hand-to-mouth basis. Prices show a tendency to slightly lower levels, in expectation of a bumper corn crop in the Middle-west. Paper making starch is quoted at $3.45 per 100 pounds, in bags, and at $3.70 per 100 pounds, in barrels, car lots, f.o.b., Chicago.

SULPHATE OF ALUMINA—The demand for sulphate of alumina continues at seasonable levels, with the contract movement steady. Prices are firm and unchanged from previous quotations. Commercial grades are quoted at from $1.25 to $1.60; iron free is selling at from $2 to $2.25 per 100 pounds, in barrels, at works.

SULPHUR—The sulphur market is firm. Prices are steady at former levels. Annual contracts continue to be quoted at $18 per long ton, f.o.b., cars at mines. The price on spot and nearby car lots is $21 per ton, all in car lots.

TALC—The demand for talc continues steady. Prices are firm and unchanged from prevailing quotations. Domestic talc is selling at from $15 to $18 per ton, Eastern mines. Imported talc is quoted at from $23 to $30 per ton, on dock.

Market Quotations

Paper

Tissues—Per Ream—

White No. 1	1.10	@	—
White No. 1 M. G.	1.07½	@	—
White No. 1½	.77½	@	—
White No. 2	.75	@	—
Anti-Tarnish M. G.	.77½	@	—
Colored	.90	@	—
Kraft	.77½	@	—
Manila	.75	@	—
Unbleached Toilet	2.90	@	3.30
Bleached Toilet	3.94	@	5.26

Paper Towels—

Unbleached	2.10	@	3.35
Bleached	3.30	@	3.70

Manila—

No. 1 Jute	9.00	@	9.25
No. 2 Jute	7.75	@	8.50
No. 1 Wood	4.00	@	5.25
No. 2 Wood	3.50	@	4.00

Fibre Papers—

No. 1 Fibre	4.25	@	5.50
No. 2 Fibre	4.00	@	4.75

(Delivered New York)

News, per ton—

Roll, contract	42.50	@	—
Sheets	47.50	@	—

Kraft—

No. 1 Northern	5.25	@	5.75
Standard	5.00	@	—
Southern	5.00	@	—
Glazed	4.50	@	—
Striped	4.75	@	—

Boards, per ton—

News	47.50	@	—
Chip	45.00	@	—
Sgl. Mla. Ll. Chip	55.00	@	—
Jute Lined Chip	55.00	@	—
Kraft Liners	65.00	@	—
White Pat. Coated	67.50	@	—
Binders Boards	75.00	@	80.00

The following are representative of distributors' resale prices:—

Rag Content Bonds and Ledgers—
White, Assorted Items,
Delivered in Zone 1:

	Bonds	Ledgers
100% Rag Ext. No. 1	$41.40@$48.50	$42.55@$50.00
100% Rag	32.80@ 38.50	33.95@ 39.75
85% Rag	.....	32.20@ 37.75
75% Rag	24.75@ 29.00	25.90@ 30.50
65% Rag	21.65@ 26.25	22.80@ 27.75
50% Rag	18.70@ 22.75	19.90@ 24.25
25% Rag	15.80@ 19.25	16.95@ 20.75

Regular Colors @ $1.50 cwt. extra.
Heavy Colors @ $3.00 cwt. extra

Sulphite Bonds and Ledgers—
White, Assorted Items,
Delivered in Zone 1:

	Bonds	Ledgers
No. 1	$9.35@$11.50	$10.55@$12.75
No. 2	8.50@ 10.25	9.65@ 11.75
No. 4	7.60@ 9.25	8.80@ 10.75

Regular Colors @ $1.50 cwt. extra.
Heavy Colors @ $3.00 cwt. extra.

Free Sheet Book Papers—
White, Cased Paper,
Delivered in Zone 1:

No. 1 Glossy Coated	$12.45@	$14.25
No. 2 Glossy Coated	10.80@	12.25
No. 3 Glossy Coated	9.65@	11.00
No. 4 Glossy Coated	9.05@	10.50
No. 1 Antique (watermarked)	9.05@	10.50
No. 2 Offset	8.35@	9.50
A Grade E. F.	8.20@	9.50
A Grade S. & S. C.	8.45@	9.75
B Grade E. F.	7.60@	8.75
B Grade S. & S. C.	7.85@	9.00
C Grade E. F.	7.30@	8.50
C Grade S. & S. C.	7.55@	8.75
D Grade E. F.	7.00@	8.25
D Grade S. & S. C.	7.25@	8.50

Ivory & India at $.50 cwt. extra.

Mechanical Pulp

(On Dock, Atlantic Ports)

No. 1 Imported—		
Moist	35.00	@36.00
Dry	40.00	@42.00
(Delivered)		
No. 1 Domestic and Canadian	36.00	@37.50

Chemical Pulp

(On Dock, Atlantic, Gulf and West Coast Ports)

Bleached Sulphite (Domestic and Foreign)—			
Prime Bleached Sulphite	3.50	@	4.65
Prime Qualities—			
Easy-Bleaching Sulphite	3.50	@	4.00
Strong Unbleached Sulphite	3.00	@	3.65
(On Dock, Atlantic Ports)			
Kraft Bleached	4.00	@	4.75
Kraft Light & Strong	3.00	@	3.75
Kraft No. 1	2.90	@	3.65
Kraft No. 2	2.50	@	2.75
(F.o.b. Pulp Mill)			
Kraft Domestic	2.25	@	3.10
(Delivered)			
Soda Bleached	3.25	@	—

Add 60 cents per short ton, dock charges, for Albany; $2.00 for Lake Ports East and $3.00 for Lake Ports West of Mackinac Straits.

Domestic Rags

New Rags

(Prices to Mill f. o. b. N. Y.)

Shirt Cuttings—			
New White, No. 1	8.75	@	9.00
Silesias, No. 1	6.75	@	7.00
New Unbleached	9.25	@	9.50
Blue Overall	7.25	@	7.50
Fancy	3.75	@	4.25
Washables	2.75	@	3.25
Mixed Khaki Cuttings	4.25	@	4.50
O. D. Khaki Cuttings	4.75	@	5.00

Old Rags

White, No. 1—			
Repacked	3.75	@	4.25
Miscellaneous	3.00	@	3.25
White, No. 2—			
Repacked	2.60	@	2.85
Miscellaneous	2.00	@	2.25
Thirds and Blues—			
Repacked	2.00	@	2.25
Miscellaneous	1.90	@	2.00
Roofing Rags—			
No. 1	1.55	@	1.60
No. 2	1.40	@	1.45
No. 3 (bagging)	.90	@	1.00
No. 4	.90	@	1.00
No. 5A	.75	@	.85

Foreign Rags

New Rags

New Dark Cuttings	Nominal
New Mixed Cuttings	Nominal
New Light Silesias	Nominal
Light Flannelettes	Nominal
New White Cuttings	Nominal
New Light Oxfords	Nominal
New Light Prints	Nominal

Old Rags

No. 1 White Linens	Nominal
No. 2 White Linens	Nominal
No. 3 White Linens	Nominal

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They are all "Live Wires"

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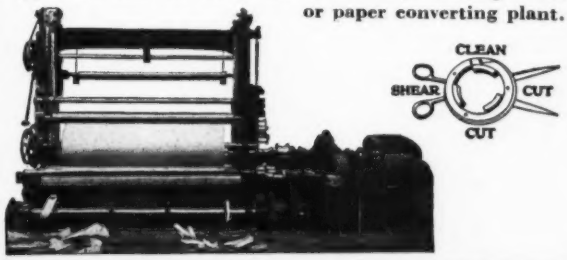

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OF ALL DESCRIPTIONS, BLANK OR FINISHED

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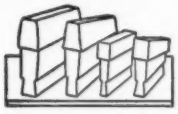

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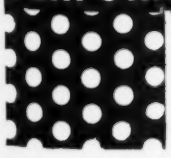

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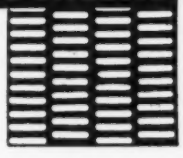

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DURIMET • DURCO KA2SMo

No. 4 White Linens.	Nominal
No. 1 White Cotton	Nominal
No. 2 White Cotton.	Nominal
No. 3 White Cotton.	Nominal
No. 4 White Cotton	Nominal
Extra Light Prints..	Nominal
Ord. Light Prints...	Nominal
Med. Light Prints...	Nominal
Dutch Blue Cottons..	Nominal
French Blue Linens..	Nominal
German Blue Linens.	Nominal
German Blue Cottons	Nominal
Checks and Blues...	Nominal
Linsey Garments....	Nominal
Dark Cottons.....	Nominal
Old Shopperies.....	Nominal
New Shopperies.....	Nominal
French Blues.....	Nominal

Old Rope and Bagging

(Prices to Mill f. o. b. N. Y.)

Gunny No. 1—			
Foreign	2.35	@	2.50
Domestic	2.25	@	2.35
Wool Tares, light....	1.75	@	1.85
Wool Tares, heavy...	2.35	@	2.45
Bright Bagging.....	1.70	@	1.75
Manila Rope—			
Foreign	4.75	@	5.00
Domestic	5.00	@	5.25
Jute Strings.....	2.75	@	3.00
Sisal Strings.....	2.60	@	2.75
Mixed Strings.....	Nominal		

Old Waste Papers

(F. o. b. New York)

Shavings—			
White Envelope Cuttings	3.10	@	3.25
Ordinary Hard White No. 1....	2.60	@	2.70
Hard White No. 2.	2.40	@	2.50
Soft White No. 1..	2.30	@	2.40
Flat Stock—			
Stitchless	1.50	@	1.55
Overissue Mag....	1.50	@	1.55
Solid Flat Book...	1.20	@	1.25
Crumbled No. 1...	.85	@	.95
Ledger Stock.....	1.55	@	1.60
New B. B. Chips....	.45	@	.50
Manila—			
New Env. Cut.....	2.15	@	2.25
New Cuttings.....	1.65	@	1.75
Old Kraft Machine—			
Compressed bales..	1.55	@	1.65
News—			
No. 1 White News	1.45	@	1.55
Strictly Overissue..	.65	@	.75
Strictly Folded....	.42½	@	.47½
No. 1 Mixed Paper..	.45	@	.50

Twines

(F. o. b. Mill)

(Soft Fibre)			
Coarse Polished—			
India	.16	@	.18½
White Hemp.....	.17	@	.20½
India Compress....	.16½	@	.17
Fine Polished—			
Fine India.....	.22	@	.24
Unpolished—			
Box	.11¾	@	.12¾
Paper Makers.....	.11½	@	.13½
Tube Rope.....	.12½	@	.15¼
Wall Paper.....	.13½	@	.14¼
Wrapping	.17	@	.21
Soft Fiber Rope..	.15¼	@	—
(Hard Fibre)			
Medium Java.....	.13½	@	.14
Mex. Sisal.....	.12	@	.16
Manila	.21	@	.28
Domestic	4.25	@	4.50
Transmission Rope..	2.00	@	2.25
Jute Rope.....	1.85	@	2.12½
Soft Jute Strings....	2.00	@	2.50
Jute Carpet Threads.	1.75	@	2.00
Gunny No. 1			
Foreign	2.35	@	2.40
Domestic	2.10	@	2.15
Bleachery Burlap....	4.00	@	4.25
Scrap Burlap—			
Foreign	2.15	@	2.25
Domestic	1.75	@	1.85
Scrap Sisal	2.25	@	2.30
Scrap Sisal for Shredding	2.40	@	2.50
Wool Tares, heavy...	—	@	2.25
New Burlap Cuttings	2.45	@	3.00
Aust. wool pouches..	3.25	@	3.50
Heavy bailing bagging	2.50	@	2.70
Paper Mill Bagging..	1.70	@	1.75
Bagging No. 2.....	1.00	@	1.10

Domestic Rags (New)

(F. o. b. Boston)

Shirt Cuttings—			
New Light Prints.	.03½	@	.03¾
New White No. 1.	.08½	@	.08¾
New White No. 2.	.06	@	.06½
New Light Flannelettes	—	@	.06½
Silesias No.	—	@	.06½
New Black Silesias.	.04¼	@	.04½
Soft Unbleached...	.09¼	@	.09½
Blue Cheviot.....	.07¼	@	.07½
Fancy	.03¾	@	.04
Washable	.03	@	.03¼
Cottons—According to grades—			
Blue Overalls.....	.07	@	.07¼
New Black, soft.....	.04¼	@	.04½
Khaki Cuttings.....	.04½	@	.04¾
O. D. Khaki.....	.04¾	@	.05
Corduroy	.03¼	@	.03½
New Canvas.....	.07¾	@	.08¼
B.V.D. Cuttings.....	.08¾	@	.09

Domestic Rags (Old)

(F. o. b. Boston)

Canvas	.04½	@	—
White No. 1—			
Repacked	—	@	2.75
Miscellaneous	2.50	@	2.75
White No. 2—			
Repacked	1.90	@	2.00
Miscellaneous	2.00	@	2.25
Twos and Blues.....	1.75	@	2.00
Third and Blues—			
Repacked	1.37½	@	1.75
Miscellaneous	1.25	@	1.62½
Black Stockings.....	3.90	@	4.00
Roofing Stock—			
No. 1	1.40	@	1.50
No. 2	1.30	@	1.35
No. 3	1.05	@	1.15

Foreign Rags

(F. o. b. Boston)

Dark Cottons.....	1.65	@	1.85
Dutch Blues.....	3.00	@	3.15
New Checks and Blues	2.85	@	3.00
Old Fustians.....	3.00	@	3.25
Old Linsey Garments	2.15	@	2.50
New Silesias.....	6.50	@	7.00

PHILADELPHIA

Domestic Rags (New)

(Price to Mill, f. o. b. Phila.)

Shirt Cuttings—			
New White, No. 1.	—	@	.09
New White, No. 2.	.04½	@	.05
Light Silesias.....	.05½	@	—
Silesias, No. 1....	—	@	.05½
Black Silesias, soft.	.03½	@	.04
New Unbleached..	.08¼	@	.08¾
Washable, No. 1..	.02¼	@	.02½
Blue Overall.....	.06½	@	.07
Cottons—According to grades—			
Washable, No. 2..	—	@	.02
New Blue.....	.01¾	@	.02
Fancy Percales....	—	@	.03½
New Black Soft...	.03	@	.03½
New Light Seconds	—	@	.05½
New Dark Seconds	1.50	@	1.75
Khaki Cuttings—			
No. 1 O. D.....	.04	@	.04½
No. 2 Mixed.....	—	@	.03
Corduroy	.02¾	@	.03
New Canvas.....	.06½	@	.07
New Black Mixed.	.02	@	.02¾

Domestic Rags (Old)

White No. 1—			
Repacked	3.50	@	4.00
Miscellaneous	2.75	@	3.25
Thirds and Blues—			
Miscellaneous	2.00	@	2.25
Repacked	2.25	@	2.50
Black Stockings (Export)	4.50	@	5.00
Roofing Stock—			
Foreign No. 1....	1.75	@	2.00
Domestic No. 1...	1.50	@	1.70
Domestic No. 2...	1.30	@	1.40
Roofing Bagging..	—	@	1.25

Bagging

(F. o. b. Phila.)

Gunny, No. 1—			
Foreign	1.80	@	2.00
Domestic	2.00	@	2.25
Manila Rope.....	4.25	@	4.50
Sisal Rope.....	2.00	@	2.25
Mixed Rope	1.00	@	1.10
Scrap—			
No. 1.....	2.00	@	2.25
No. 2.....	1.00	@	1.25
Wool Tares, heavy..	3.25	@	3.50
Mixed Strings.....	1.00	@	1.10
No. 1 New Light Burlap	3.00	@	3.50
New Burlap Cuttings	2.00	@	2.25

Old Papers

(F. o. b. Phila.)

Shavings—			
No. 1 Hard White.	—	@	2.60
No. 2 Hard White.	2.20	@	2.25
No. 1 Soft White..	2.25	@	2.30
No. 2 Soft White..	1.75	@	—
No. 1 Mixed.....	—	@	.85
Solid Ledger Stock...	—	@	1.75
Ledger Stock, white.	1.75	@	—
Ledger Stock, colored	1.50	@	—
No. 1 Books, heavy..	1.10	@	1.15
Manila Cuttings.....	1.80	@	1.90
Print Manila.....	.70	@	.75
Container Manila....	.65	@	—
Kraft Paper.....	1.75	@	—
No. 1 Mixed Paper..	.40	@	.45
Straw Board Chip..	.50	@	—
Binders Board Chip.	.50	@	—
Corrugated Board...	.65	@	.70
Overissue News.....	.70	@	.75
Old Newspapers.....	.55	@	.60

BOSTON

Old Papers

(F. o. b. Boston)

Shavings—			
No. 1 Hard White.	2.20	@	2.35
No. 1 Soft White..	1.85	@	2.15
No. 2 Mixed.....	.75	@	.80
Solid Ledger Books..	1.50	@	1.75
Overissue Ledger Stock	1.30	@	1.50
Mixed Ledgers.....	.85	@	.90
No. 1 Books, heavy..	1.00	@	1.10
No. 1 Books, light..	.65	@	.75
Crumpled Stitchless Book Stock.....	.50	@	.60
Manila Env. Cuttings	1.60	@	1.70
Manila Env. Cuttings, extra quality.....	2.20	@	2.30
No. 1 Old Manila...	.95	@	1.00
White Blank News..	1.30	@	1.40
No. 1 Kraft.....	1.75	@	—
Mixed Papers.....	.42½	@	.47½
Print Manila.....	.65	@	.70
Container Manilas...	.27½	@	—
Old Newspapers.....	.52½	@	.57½
Overissue News.....	.60	@	.65
Box Board Chips....	.35	@	.40
Corrugated Boxes...	.62½	@	.67½
Kraft corrugated boxes	1.20	@	1.22½
Screening Wrappers..	.60	@	.65

Bagging

(F. o. b. Boston)

Manila Rope—			
Foreign	4.25	@	4.40

CHICAGO

Old Papers

(F. o. b. Chicago)

Shavings—			
No. 1 White Envelope Cuttings....	3.30	@	3.40
No. 1 Hard White.	2.60	@	2.70
No. 1 Soft White..	2.10	@	2.15
Ledger & Writings..	1.40	@	1.50
Solid Books.....	1.25	@	1.30
Blanks	1.50	@	1.65
Krafts	1.00	@	1.25
New Kraft Cuts....	1.80	@	2.00
Manila Env. Cuts...	2.20	@	2.35
Ex. No. 1 Manila...	2.20	@	2.35
Print Manila.....	1.70	@	1.80
Overissue News.....	.80	@	.90
Old Newspapers—			
No. 1 Folded News	.80	@	.90
No. 1 Mixed Paper	.80	@	.90
Roofing Stocks—			
No. 1	2.00	@	2.25
No. 2	1.85	@	2.00

TORONTO

Paper

Bonds and Ledgers

Delivered

No. 1 White	.35½	@	.36½
No. 1 Tints	.36½	@	.37½
No. 2 White	.26½	@	—
No. 2 Tints	.27½	@	—
No. 4 White	—	@	.1550
No. 4 Tints	.16	@	.1650
No. 5 Bond—White	.11.35	@	—
No. 5 Bond—Tints	.12.35	@	—
No. 5 Bond—Golden Rod	.13.35	@	—
No. 5 Ledger—White	.1185	@	—
No. 5 Ledger—Tints.	.1285	@	—
No. 6 Bond—White	.10.75	@	—
No. 6 Bond—Tints	.11.25	@	—
No. 6 Bond—Golden Rod	.12.75	@	—
No. 7 Bond—White	9.10	@	—
No. 7 Bond—Tints	9.60	@	—
No. 7 Bond—Golden Rod	.11.10	@	—

Book—

No. 1 M. F.	7.10	@	7.35
No. 2 M. F.	6.85	@	7.20
No. 3 M. F.	5.60	@	6.20
No. 1 S. C.	7.60	@	7.85
No. 2 S. C.	7.10	@	7.35
No. 3 S. C.	6.10	@	6.35
No. 1 Coated and Litho	12.50	@	—
No. 2 Coated and Litho	11.00	@	—
No. 3 Coated and Litho	9.50	@	10.00
Coated tinted	13.00	@	13.50

Wrapping—delivered—

Rag Brown	4.85	@	5.55
White Wrap	4.00	@	—
"B" Manila	4.90	@	6.25
No. 1 Manila	5.50	@	7.00
Fiber	5.50	@	—
Kraft, No. 2	5.50	@	—

(F. o. b. Cars, Toronto)

News, per ton—			
Rolls (contract)	38.50	@	—
Sheets	45.50	@	—

Pulp

Ground wood	32.00	@	—
Unbleached Sulphite	59.00	@	—
Book (Class 1)	71.00	@	—
Writing (Class 2)	72.00	@	—
Select (Class 3)	73.00	@	—

Old Waste Paper

(In carload lots, f. o. b. Toronto)

Shavings—			
White Env. Cut...	2.50	@	—
Soft White.....	2.15	@	—
White Blk. News..	1.25	@	1.40
Book and Ledger—			
Flat Magazine and Book Stock (old)	1.00	@	—
Light and Crumpled Book Stock.	.85	@	—
Ledgers and Writings	1.20	@	—
Manilas—			
New Manila Cut...	1.50	@	—
Printed Manilas...	.65	@	—
Kraft	1.00	@	1.70
News and Scrap—			
Strictly Overissue.	.65	@	—
Strictly Folded....	.60	@	—
No. 1 Mixed Paper..	.50	@	—

Domestic Rags

(Price to mills, f. o. b. Toronto)

No. 1 White Shirt Cuttings	.09	@	.09¼
Fancy Shirt Cuttings	.03½	@	.03¾